DEC 4000 Model 600 AXP Rackmount Series Installation /Owner's Guide

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DEC 4000 AXP (all configurations with RF/RZ73, RZ26 drives) acoustics — declared values per ISO 9296 and ISO 7779 (June 22, 1992):

	L_{wAd}, B	L_{pAm}, dBA (Bystander Positions)
Idle	6.4	45
Operating	6.5	46

Current values for specific configurations are available from Digital representatives. 1 B = 10 dBA.

Schallemissionswerte — Werteangaben nach ISO 9296 und ISO 7779 /DIN45635-19:

	Schalleistungspegel L_{wAd}, B	Schalldruckpegel L_{pAm}, dBA (Zuschauerpositionen)
Leerlauf	6.4	45
Betrieb	6.5	46

Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich. 1 B = 10 dBA.

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Preface

Purpose of This Guide

This guide describes how to install, operate, troubleshoot, and maintain the DEC 4000 AXP Rackmount system.

Who Should Use This Guide

This guide is for Digital service personal or qualified self-maintenance customers who are familiar with installing computer systems, and for system managers and others who perform system management tasks.

Structure of This Guide

This guide contains information about installing and using your system to best advantage:

- Chapter 1 introduces the system.
- Chapter 2 describes how to install your system into a standard EIA 19-inch cabinet and make the appropriate connections.
- Chapter 3 describes the basic system management tasks and how to start the system.
- Chapter 4 describes how to use the console mode environment.
- Chapter 5 describes the console commands.
- Chapter 6 describes how to set environment variables.
- Chapter 7 describes how to operate mass storage devices.
- Chapter 8 describes how to identify your system configuration and how to change your configuration.
- Chapter 9 describes system features.
- Chapter 10 describes how to maintain your system and customize its exterior.

- Chapter 11 explains how to identify and resolve problems that prevent you from operating the system.
- Chapter 12 provides the removal and installation procedures for the recommended spare parts. **This chapter is for use by Digital customer service personnel and qualified self-maintenance customers only.**
- Appendix A provides the specifications for the DEC 4000 AXP Rackmount Series System.
- Appendix B lists the recommended spare parts and other system field replaceable units unique to the DEC 4000 AXP Rackmount Series System.
- The Glossary contains technical terms that are used in this book.

Finding More Information

Occasionally, this guide directs you to a different document (also listed below). The last page of each chapter shows you where to find more information about the topics in that chapter.

- *DEC 4000 Model 600 Series Site Preparation Checklist* (EK-KN430-SP)
- *DEC 4000 Model 600 Series Technical Manual* (EK-KN430-TM)
- *DEC 4000 AXP Model 600 Series Service Guide* (EK-KN430-SV)
- *DEC 4000 AXP Model 600 Series Options Guide* (EK–KN430-OG)
- *R400X Expander Installation* (EK–R400X–CM)
- *OpenVMS Alpha Version 1.0 Upgrade and Installation Manual* (AA–PQYSA–TE)
- Network Installation Guide for your network

Conventions

The following table lists conventions used in this guide.

Convention	Meaning
Return	A key name enclosed in a box indicates that you press that key.
Ctrl/*x*	Ctrl/*x* indicates that you hold down the Ctrl key while you press another key, indicated here by *x*. In examples, this key combination is enclosed in a box, for example, Ctrl/C.
lowercase	Lowercase letters in commands indicate that commands can be entered in uppercase or lowercase.
	In some illustrations, small drawings of the DEC 4000 AXP Rackmount system appear in the left margin. Shaded areas help you locate components on the front or back of the system.
Warning	Warnings contain information to prevent personal injury.
Caution	Cautions provide information to prevent damage to equipment or software.
Note	Notes call the reader's attention to any item of information that may be of special importance.
`[ ]`	In command format descriptions, brackets indicate optional elements.
console command abbreviations	Console command abbreviations must be entered exactly as shown.
`boot`	Console and operating system commands are shown in this special typeface.
italic type	Italic type in console command sections indicates a variable.
< >	In console mode online help, angle brackets enclose a placeholder for which you must specify a value.
{ }	In command descriptions, braces containing items separated by commas imply mutually exclusive items.
❶ ❷ ❸ . . .	In figures, labels a part of the figure. In text, refers to a labeled part of a corresponding figure.

Safety Symbols

The following symbols appear on the power supply. Please review their definitions below:

This Dangerous Voltage warning symbol indicates risk of electric shock and indicates hazards from dangerous voltage.

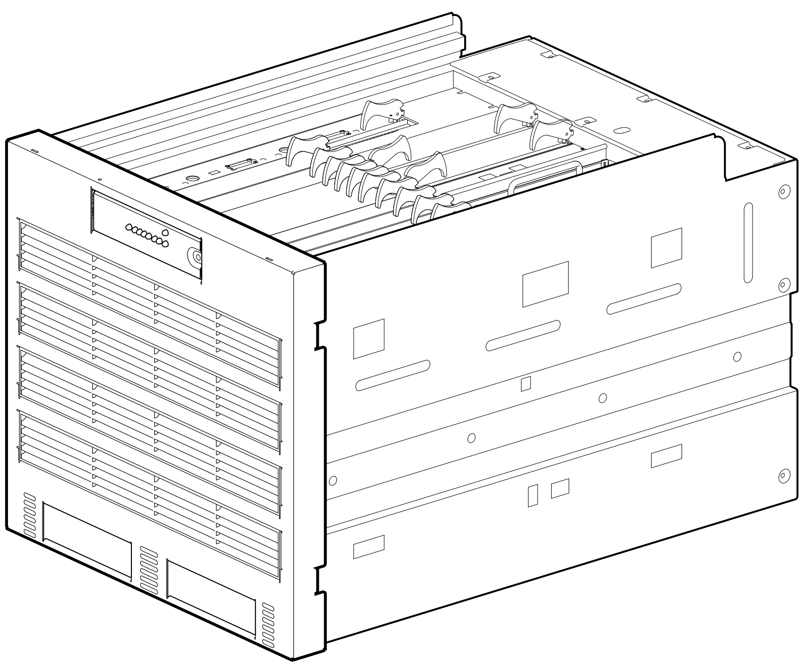
This Attention symbol is used to alert readers about specific safety conditions, and to instruct the reader to read separate instructional material.

1
Introduction

Introducing the DEC 4000 AXP Rackmount Server

The New Arrival

Congratulations on the purchase of your new DEC 4000 AXP Rackmount system!



NUO-420-00-DG

Introducing the DEC 4000 AXP Rackmount Server

In This Chapter

The DEC 4000 AXP Rackmount system is a high-performance superserver for multi-user environments. The system is contained in a slide-mounted chassis that fits into a standard 48.26-cm (19-inch) EIA enclosure.

This chapter introduces you to the location of the system components and controls.

Components and Controls

Gaining Access to Controls

System components and controls are located at the front, top, rear, and bottom of the system.

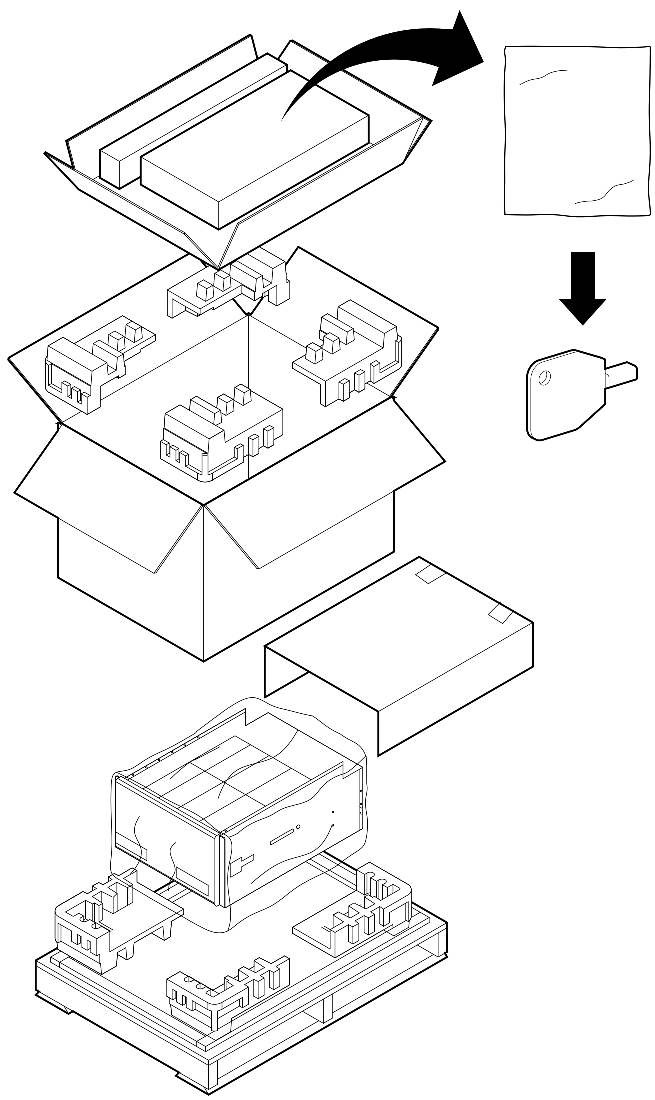
There are different ways to access the system components and controls, depending on their location. The front components (Operator Control Panel (OCP) and removable-media mass storage compartments) are accessible through openings in the front bezel. A key is used to open a door to gain access to the OCP. The key comes in a plastic bag taped to the top of the accessories box that is shipped with your DEC 4000 AXP Rackmount system. Figure 1–1 shows the location of the keys in your system shipment.

The rear components are accessible through the rear opening in the host cabinet.

The top components are accessible by removing the front bezel and pulling the system out of the cabinet.

The bottom components are located in a hinged tray in the bottom of the system chassis. You gain access to these components by removing the front bezel, pulling the system out of the cabinet, and then unlatching and lowering the hinged bottom tray from the right-hand side.

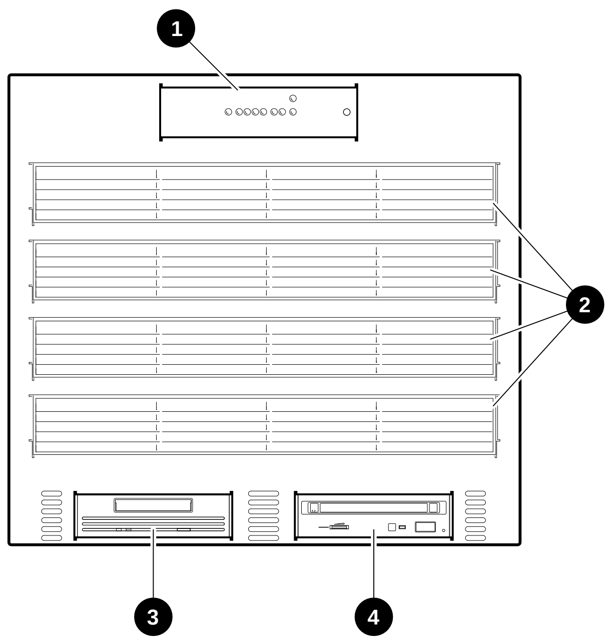
Figure 1–1 Location of System Keys



Components: Front of System

Figure 1–2 shows the components on the front of the system.

Figure 1–2 Front Components



❶ Operator control panel (OCP)

❷ Air plenum

❸ Removable-media mass storage device

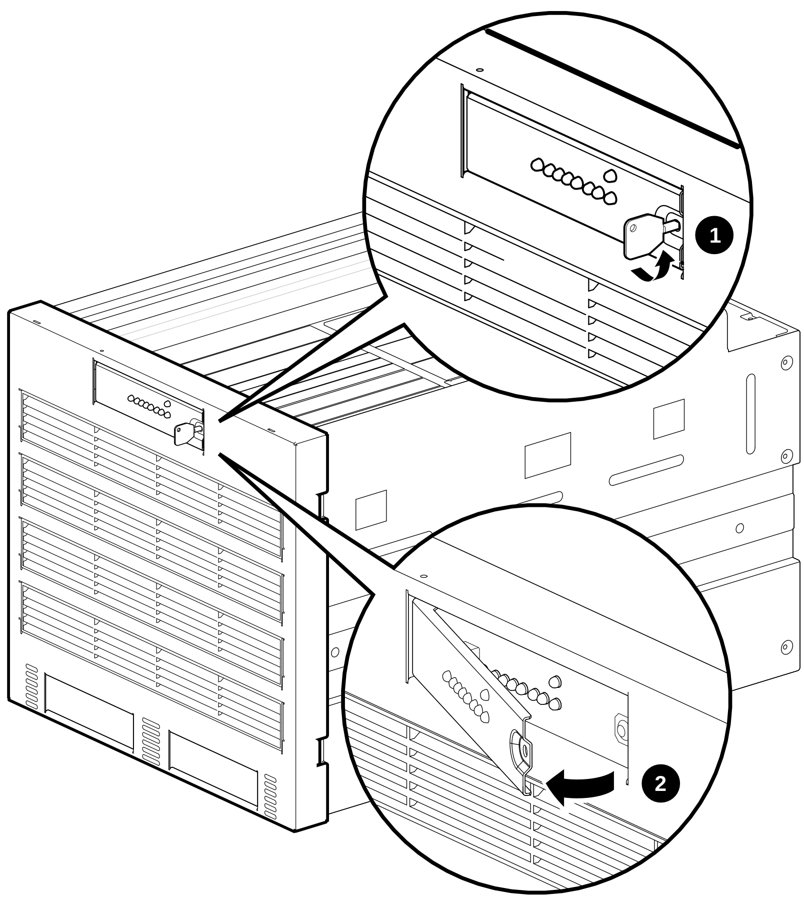
❹ Removable-media mass storage device

For information about mass storage controls, refer to device-specific information in Chapter 7 of this guide.

Opening the OCP Door

To open the OCP door, unlock the door ❶ and pull the upper right edge toward you ❷ as shown in Figure 1–3.

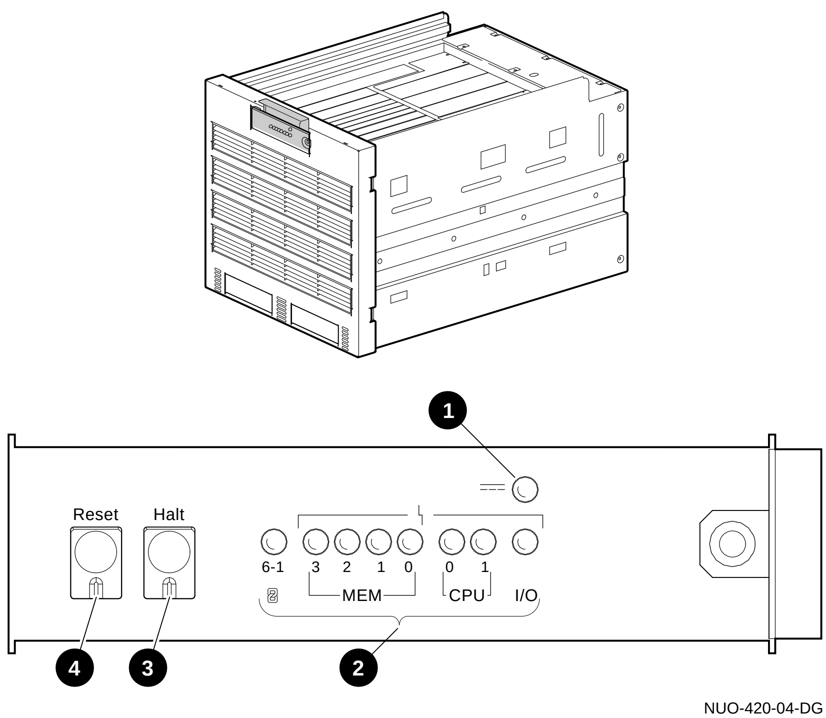
Figure 1–3 Unlocking the OCP Door



Operator Control Panel

Figure 1–4 shows the individual controls and indicators on the OCP.

Figure 1–4 Operator Control Panel



❶ DC power light

❷ Self-test status lights

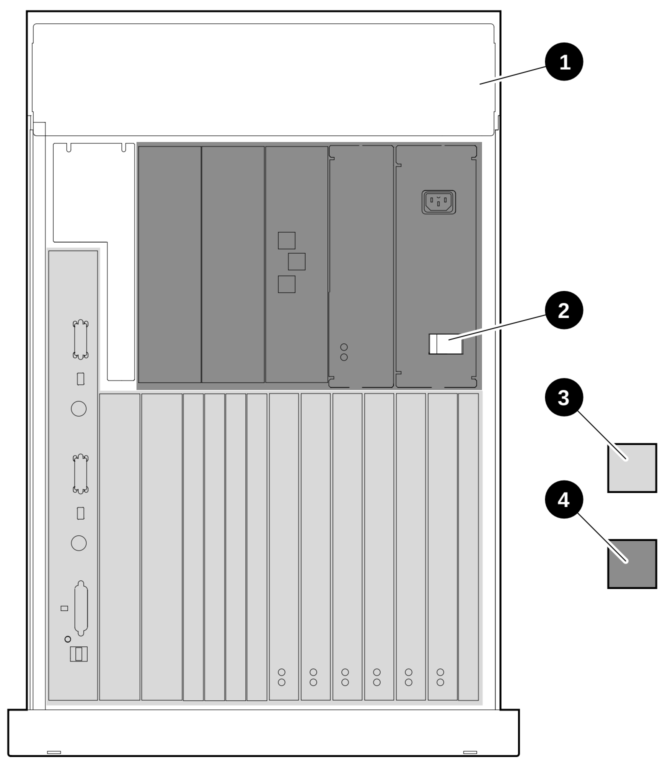
❸ Halt button

❹ Reset button

Components: Top of System

Figure 1–5 shows the major components in the top of the system.

Figure 1–5 Top View



❶ Rear compartment (contains fans, I/O daughter board)

❷ AC circuit breaker

❸ System modules and options

❹ Power subsystem

System Modules and Options

Figure 1–6 shows the module locations, lights, switches, and connectors on the card cage in the top of the system.

❶ Ethernet port 1

❷ Ethernet port 2[1]

❸ Thickwire fuse OK indicator

❹ Thickwire port

❺ Select switch

❻ ThinWire port

❼ ThinWire fuse OK indicator

❽ Auxiliary serial port

❾ Console terminal ground lug

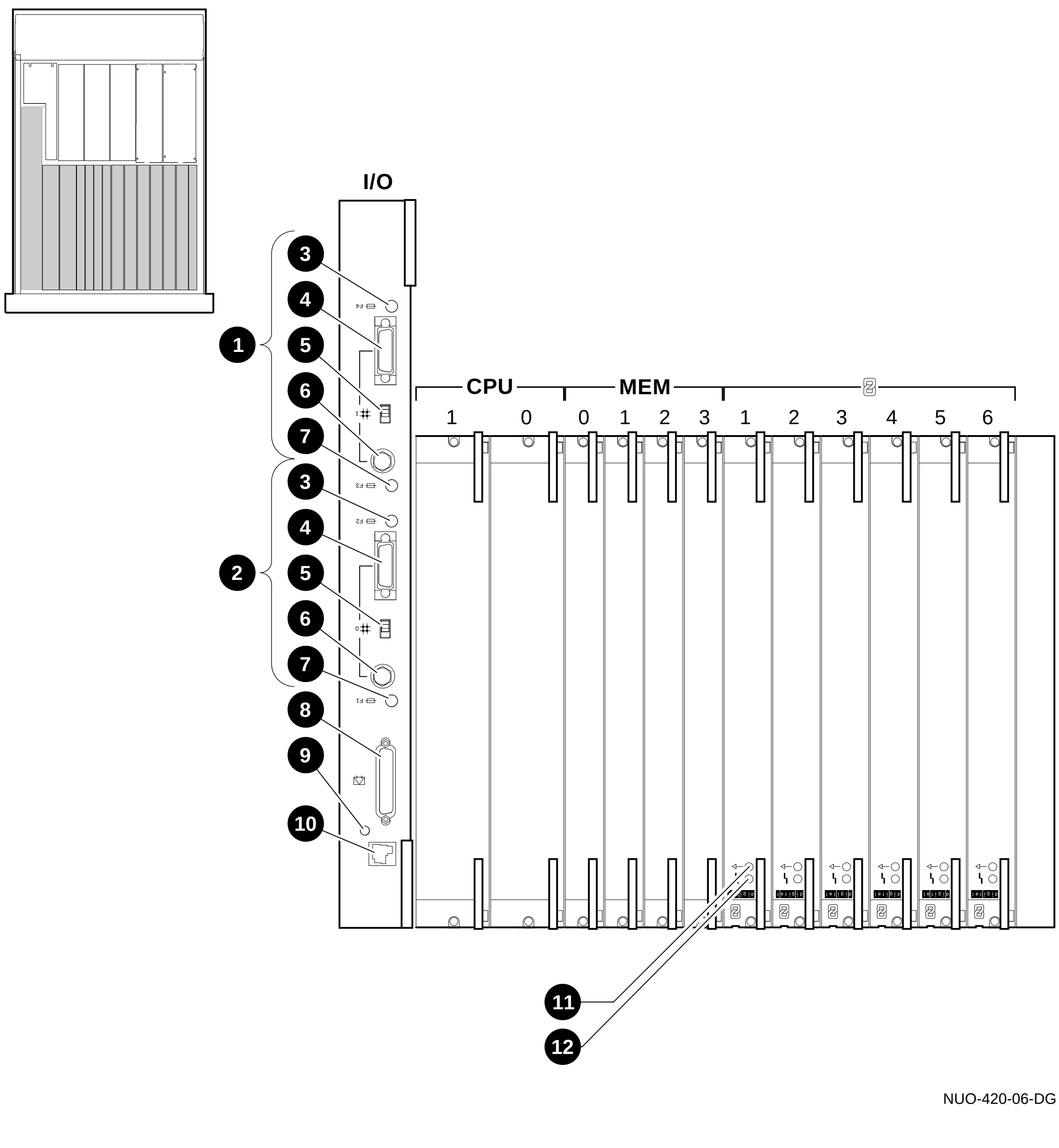
❿ Console terminal port

⓫ Futurebus+ option OK (green) indicator

⓬ Futurebus+ option fault (amber) indicator

[1] Note: Fast SCSI I/O board option has only one Ethernet port.

Figure 1–6 System Modules and Options

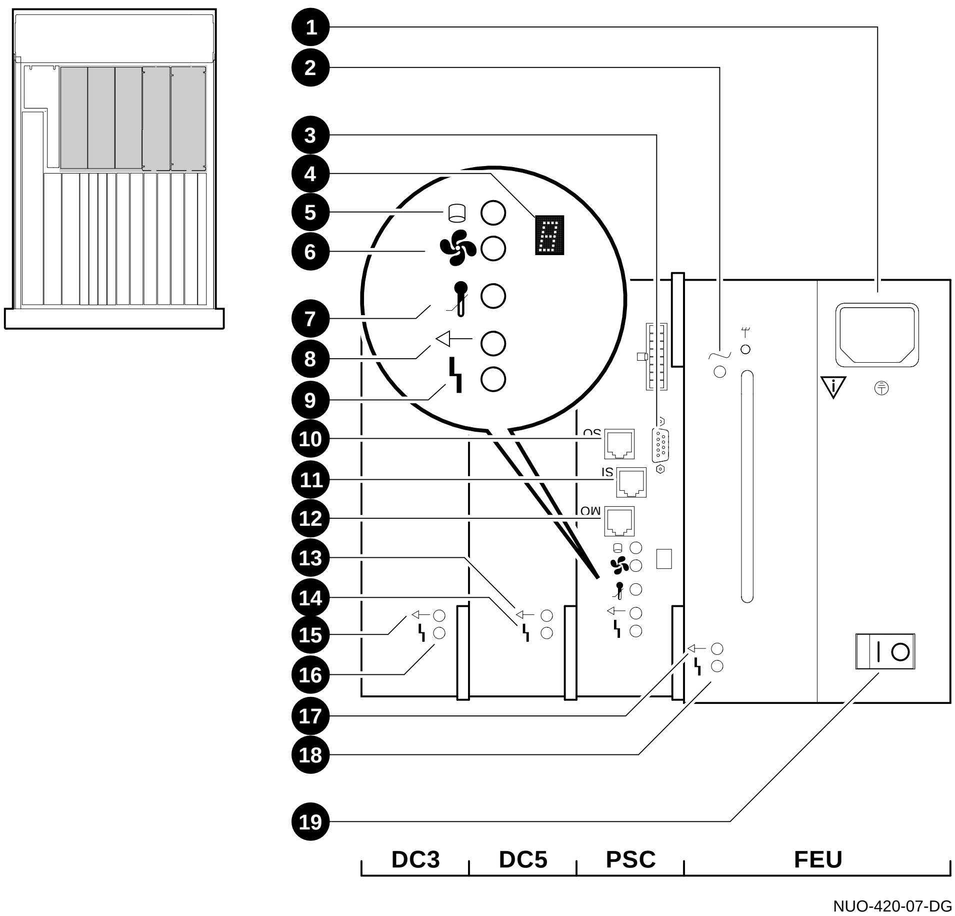


Power Subsystem

Figure 1–7 shows the lights, switches, and connectors on the power supply in the top of the system.

❶ AC power port
❷ AC present light
❸ UPS signal control port
❹ Fault ID display light
❺ Disk power failure light
❻ Fan failure light
❼ Over-temperature shutdown light
❽ PSC OK light
❾ PSC failure light
❿ Secondary power out (SO)
⓫ Secondary power in (SI)
⓬ Main power out (MO)
⓭ DC5 OK light
⓮ DC5 failure light
⓯ DC3 OK light
⓰ DC3 fault lights
⓱ FEU OK light
⓲ FEU failure light
⓳ AC circuit breaker

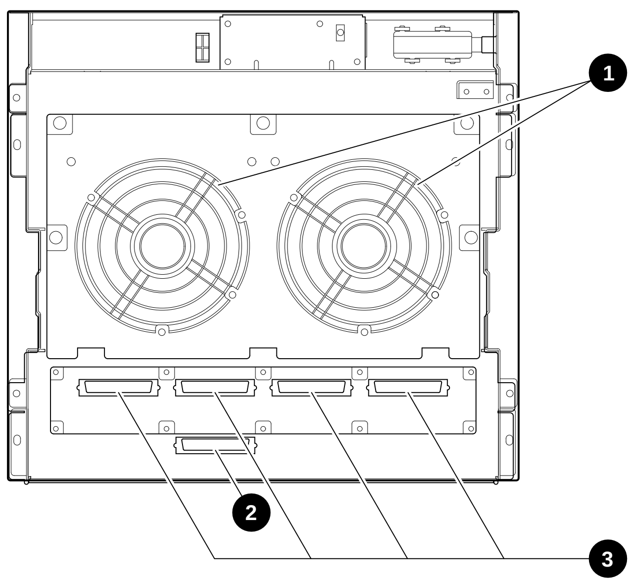
Figure 1–7 Power Subsystem



Rear Compartment Components

Figure 1–8 shows the major components at the rear of the system.

Figure 1–8 Rear Components



❶ Fans

❷ SCSI only port

❸ SCSI/DSSI ports (DSSI use requires adapter[1])

---

1 DSSI option does not apply with Fast SCSI option.

Components: Bottom Tray

Figure 1–9 shows the major components in the bottom tray of the system.

❶ Removable-media mass storage device

❷ Removable-media mass storage device

❸ Fixed-media mass storage device

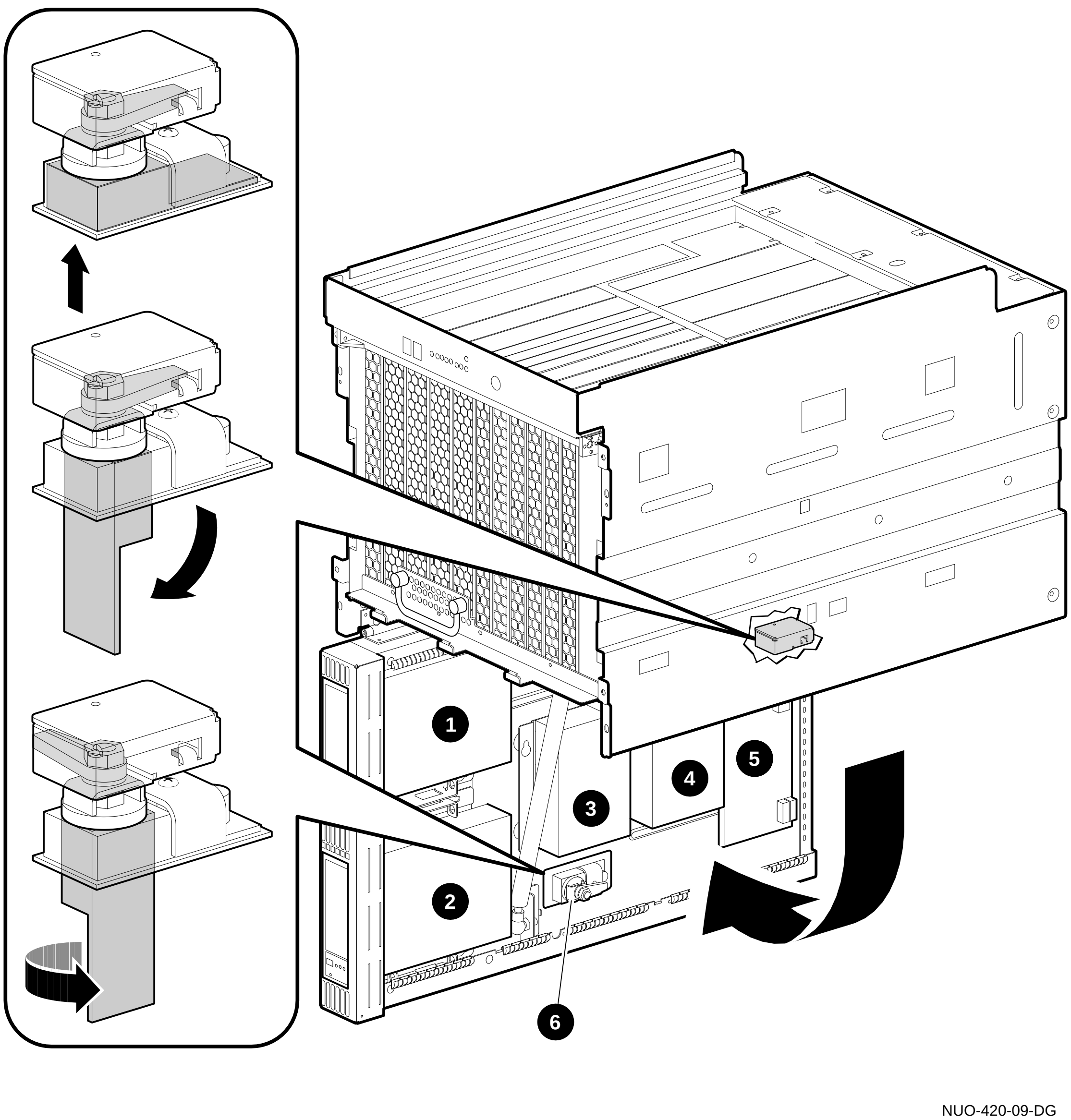
❹ Fixed-media mass storage device

❺ Local disk converter (LDC) power board

❻ Bottom tray latch

See Opening the Bottom Tray for detailed instructions on opening the bottom tray.

Figure 1–9 Bottom Tray Components



2

Installation

Introduction

In This Chapter

This chapter explains how to install your Rackmount DEC 4000 AXP Server system. The information includes the following:

- Verifying the Site Preparation
- Tools Required
- Unpacking the Shipment
- Installing the System
- Preparing the System for Operation

Before Installing Your System

Caution

Review your system warranty. It may require that a Digital service representative install your system to prevent damage to equipment or software.

Warning

The system weighs 65.7 kg (146 lbs). To prevent personal injury and equipment damage, install the system chassis in an enclosure that can be stabilized when the system is pulled out on its slides.

Verifying the Site Preparation

Site Preparation

The installation instructions that follow assume:

- Your site meets all the requirements listed in the system *Site Preparation* manual (not supplied with the system).
- All cables that you plan to connect to your system are in place and clearly labeled:

  Terminal data cables
  Telephone cables
  Network cables

- The specifications and conditions listed in Appendix A have been met.

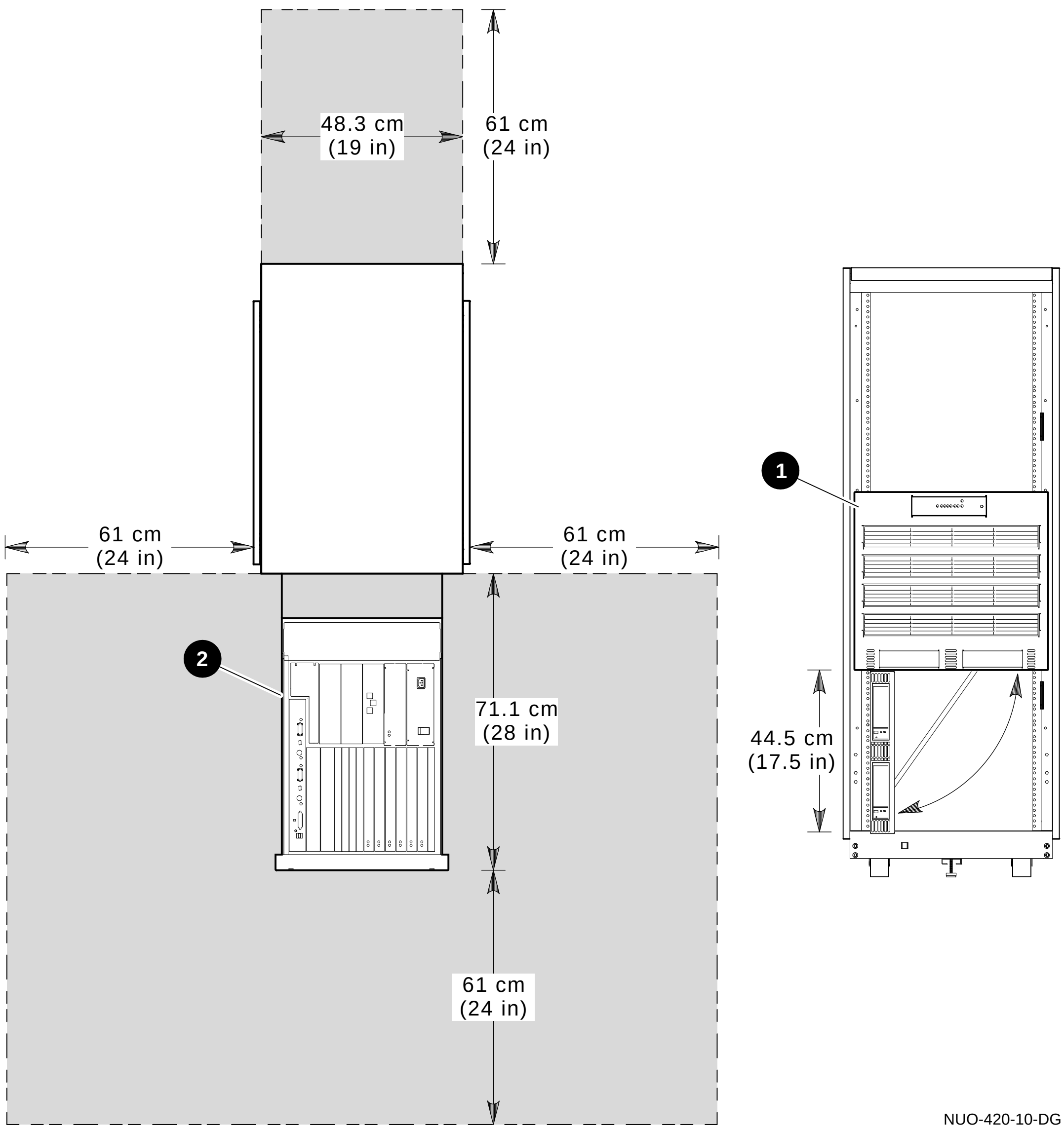
Required Clearance

Caution

Airflow through the system is from front to back. The front and rear of the unit must not be obstructed. If the internal temperature limits are exceeded, the reliability of the system could be affected.

Locate the system in an area that provides sufficient clearance for ventilation and servicing. Figure 2–1 shows the clearance required around the system.

Figure 2–1 System Clearance Requirements



❶ Front of unit

❷ Top of unit

Tools Required

You will need the following tools to install the equipment:

- Scissors
- Flat blade screwdriver
- Phillips screwdriver
- Adjustable wrench
- Set of nut drivers
- Allen wrench

Unpacking the Shipment

Checking the Shipment

Note

Save all packing materials in case you need to return the system for service or reship the system.

Check the packing list to ensure that all items listed have been received. If any item is missing or damaged, contact your delivery agent immediately, and contact your Digital sales representative.

Figure 2–2 shows the contents of the system shipping carton. Your shipment may include several cartons. One carton contains the system, hardware documentation, software documentation, system software, diagnostic software, and software licenses.

Depending on your order, your shipment may also include some of the following devices:

- Terminals
- Printers
- Modems
- Options

Unpacking the System

Figure 2–2 shows how to unpack the system and the shipping contents.

❶ Accessories

❷ OCP door key and loose hardware

❸ Information envelope

❹ Factory Installed Software Installation Cards

❺ Console terminal cable

❻ Power cord

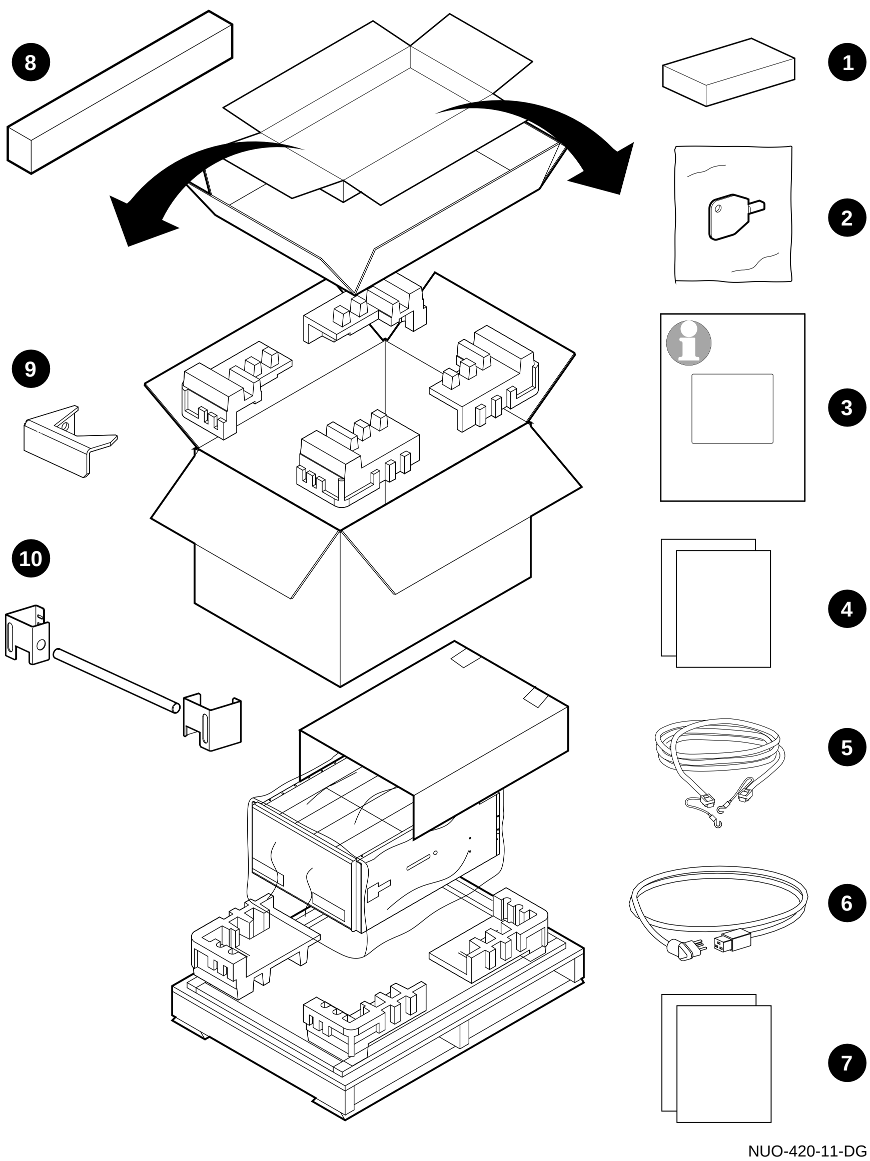
❼ Documentation

❽ Slide assemblies (one pair)

❾ Interlock actuator bracket

❿ Cable management system

Figure 2–2 Shipping Contents



Accessories

Table 2–1 lists the mounting hardware included with the system.

Table 2–1 Accessory Kit Contents (P/N 70-30535-01/02)

Description	Part Number	Quantity
Key, 1/4 turn	90-11194-01	1
Bracket, slide mounting, left	74-46127-01	1
Bracket, slide mounting, right	74-46127-02	1
Bracket, cable management, left	74-46815-01	1
Bracket, cable management, right	74-46815-02	1
U-nut, 10/32	90-07786-00	8
Tubing, cable management	74-46816-01	1
Washer, flat	90-10010-00	2
Cotter pin, 1 1/4-inch long	90-11366-01	2
Bracket, interlock actuator	74-46795-01	1
Screw, sems, M4 Pan head, 10 mm (.39 inch) long	90-40146-04	6
Accuride Slides 771-245-1/R, Rev. C	12-40248-01	1 set
Screw, flat head, 100D	90-00039-25	8
Screw, 10-32 x .375-inch, Pan head	90-09228-10	8
Screw, 10-32, Hex head, slotted	90-00061-46	24
Bar nut, 10-32 x 2.5-inch long	12-14406-00	6
SCSI terminator	12-30552-01	5
SCSI to DSSI adapter	12-39838-01	4
Power cord	17-00083-32 or 17-00083-48	1

(continued on next page)

Table 2–1 (Cont.) Accessory Kit Contents (P/N 70-30535-01/02)

Description	Part Number	Quantity
Screw 6-32 x .25-inch, TRS	90-00063-10	8
Cable clamp	90-07084-00	5
Screw, sems, M3 Pan head	90-09984-20	4
Installation Manual	EK-BA641-IN	1
Node name label	36-38609-01	1
Tee, coax, BNC	12-25869-01	1
Connector, coax, BNC, 50 ohms	12-26318-01	2
Cable assembly	17-01364-02	1

Installing the System

Equipment Slides

Remove the following material from the slide carton labeled C-711:

- One pair of slides:

  One right-hand slide
  One left-hand slide

Remove the following material from the accessories carton:

- Two mounting brackets:

  One left rear bracket (P/N 74-46127-01) stamped LEFT
  One right rear bracket (P/N 74-46127-02) stamped RIGHT

- Package containing the mounting hardware (see Table 2–1 for listing)

Preparing the Slides

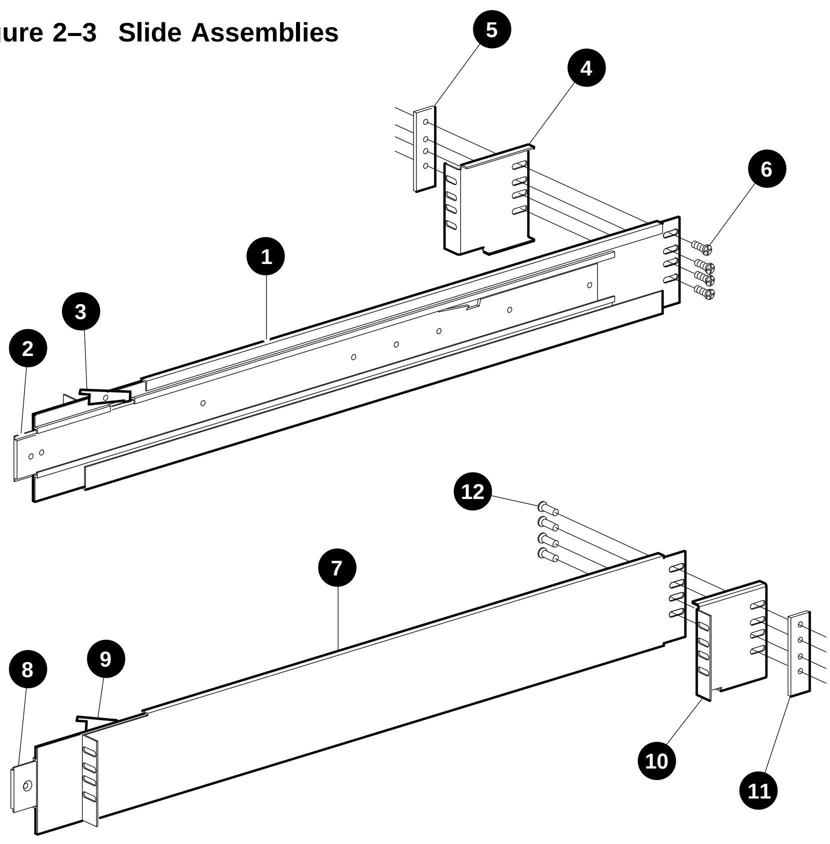
Refer to Figure 2–3 and prepare the slides as follows:

1. Locate the left slide ❶ in the kit. (The left slide has the slide lock on the left when the smooth side of the slide is facing away from you. See Figure 2–3.)
2. Remove the inner slide race ❷ from the left slide ❶ by pushing down on the slide lock ❸, and then pulling out the inner slide race from the left slide.
3. Attach the LEFT rear bracket ❹ to the left slide ❶ using 10-32 Pan head screws ❻ and nut bar ❺, but do not tighten at this time.
4. Locate the right slide ❼ in the kit. (The right slide has the slide lock on the left when the smooth side of the slide is facing you. See Figure 2–3.)
5. Remove the inner slide race ❽ from the right slide ❼ by pushing down on the slide lock ❾, and then pulling out the inner slide race from the right slide.
6. Attach the RIGHT rear bracket ❿ to the right slide ❼ using 10-32 Pan head screws ⓬ and nut bar ⓫, but do not tighten at this time.

Slide Assemblies

Figure 2–3 shows the slide assemblies and how the left and right slide extenders are installed.

Figure 2–3 Slide Assemblies



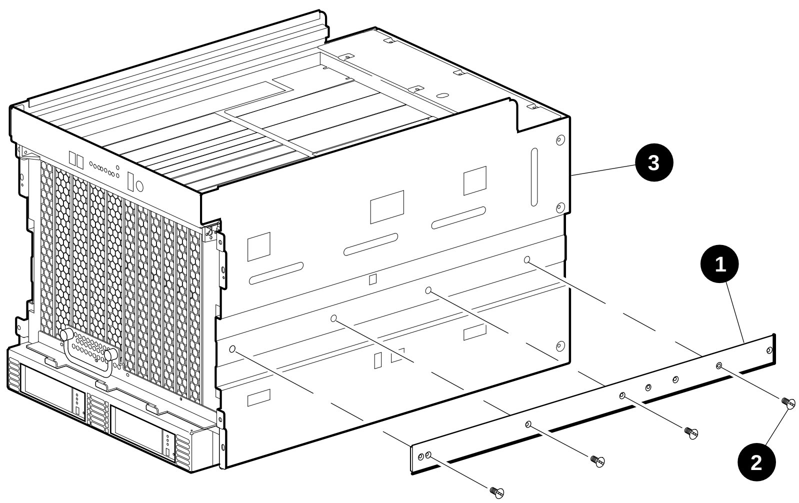
❶ Left slide	❼ Right slide
❷ Left inner slide race	❽ Right inner slide race
❸ Left slide lock	❾ Right slide lock
❹ Left rear bracket	❿ Right bracket
❺ Nut bar	⓫ Nut bar
❻ 10-32 Pan head screws	⓬ 10-32 Pan head screws

Attaching Slide Races to Chassis

To attach the slide races to the chassis, refer to Figure 2–4 and proceed as follows:

1. Attach the right slide race ❶ to the right side of the system chassis ❸ using four flat head screws ❷.
2. Attach the left slide race to the left side of the system chassis using four flat head screws.

Figure 2–4 Attaching Slide Races



Locating the Rail Mounting Holes

Before attaching the slides to the rack, you must first identify the system location in the rack and establish a datum line. The datum line serves as a reference to identify the mounting hole positions for the slide bracket, U-nuts and cable management bracket. To establish a datum line:

1. Determine the area of the rack where the system will be installed (44.5 cm [17.5 in] or 30 contiguous holes).
2. Refer to Figure 2–5. Establish a datum line ❶ at the base of the area between two holes with 1.3 cm (.5 in) spacing. The first hole above the datum line is identified as hole 1 ❷. This establishes the location of the bottom edge of the system.

The U-nuts are mounted using the 6th hole ❸ and the 22nd hole ❻ on the front rails. The slides are installed using the 11th hole ❹ through the 14th hole ❺ from the datum line. The mounting holes for the cable management brackets are the 22nd hole ❻ and the 25th hole ❼ on the rear rails. The cable management bracket is installed later in this chapter.

Note

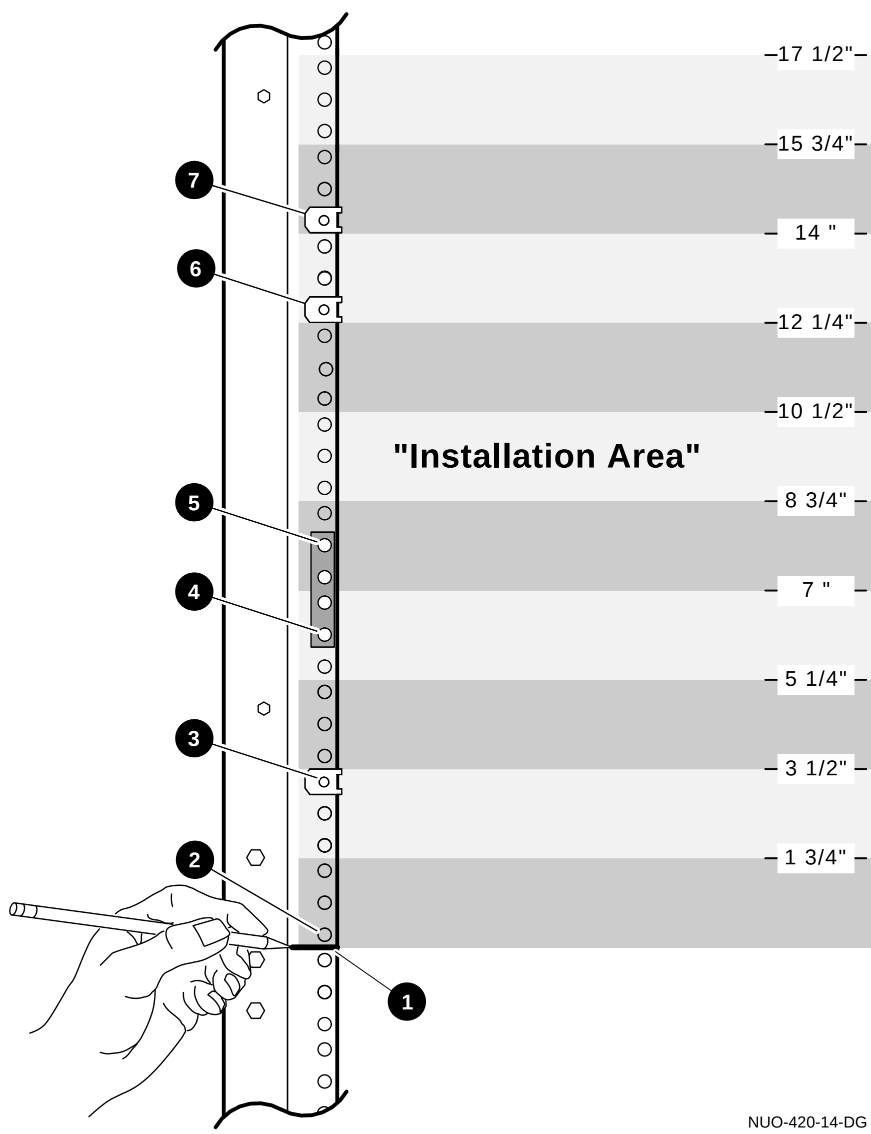
Because of the bottom hinged tray, the bottom edge of the system must be mounted at least (44.5 cm (17 1/2 in) or 30 contiguous holes) from the bottom of the cabinet to the datum line mentioned above.

Installing System U-Nuts

Four U-nuts must be installed on the rails to receive the screws that secure the system to the rails. To install the U-nuts:

1. Refer to Figure 2–5.
2. Install four U-nuts on the front left and right rails. The U-nuts should be installed at the 6th hole ❸ and the 22nd hole ❻.

Figure 2–5 Establishing Mounting Location



Attaching the Slides to Rails

The slides are installed using the 11th hole ❹ through the 14th hole ❺ from the datum line. To install the slides to the rails, refer to Figure 2–6 and proceed as follows:

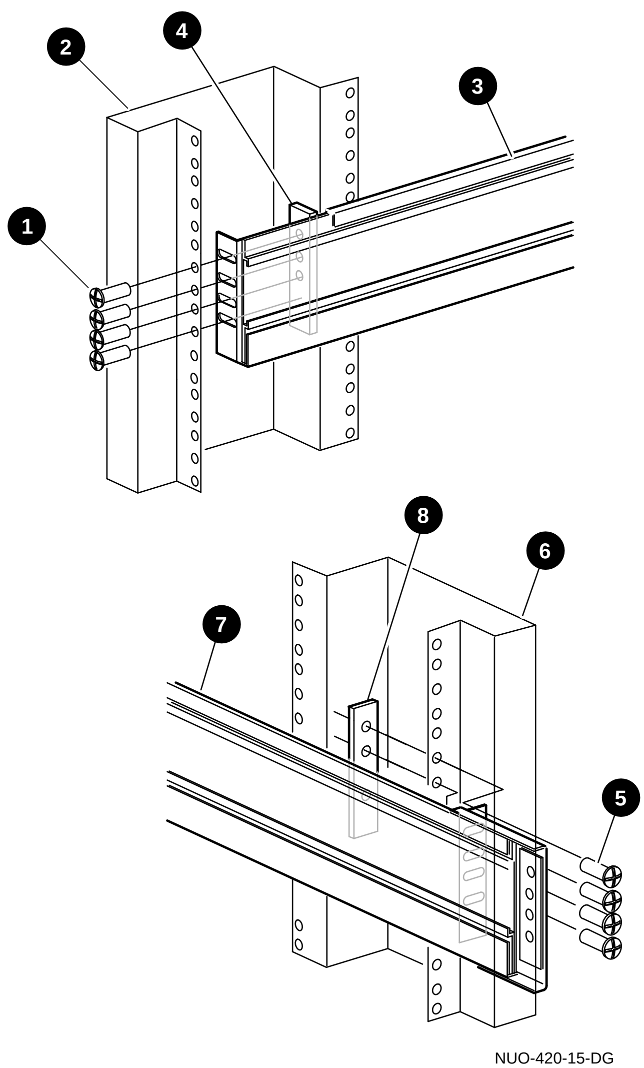
1. Adjust the left rear bracket so that it is flush with the outside left rail.
2. Tighten the screws securing the bracket to the slide at this time.
3. Repeat steps 1 and 2 for the right rear bracket.
4. Attach the left slide ❸ to the left front rail ❷ using four screws ❶ and nut bar ❹. Do not tighten the screws at this time.
5. Attach the left slide ❼ to the left rear rail ❻ using four screws ❺ and nut bar ❽.
6. Tighten screws on the front and rear rails.

Note

Pull the slide upward when securing it to the rails. Also, ensure that the slide is level and that the slides are at the same height within the cabinet.

7. Repeat steps 1 through 3 to attach the right slide to right rails.

Figure 2–6 Attaching the Slides to the Cabinet Rails



Mounting the Chassis on Equipment Slides

To mount the chassis on the slides, refer to Figure 2–7 and proceed as follows:

Warning

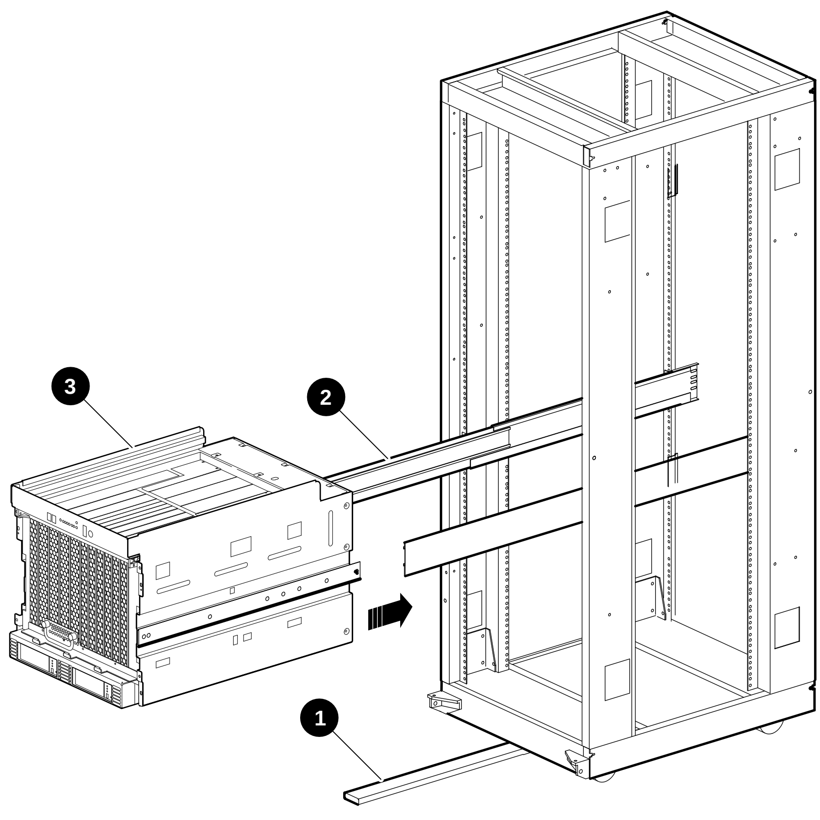
Use sufficient personnel and proper equipment when lifting or moving the Rackmount DEC 4000 computer system. The fully loaded system weighs 65.7 kg (146 lb).

Do not lift or carry the system using the system handle. Only use the system handle to pull the system out of the rack on its slides.

Ensure that the enclosure is stabilized when the system is extended on its slides. Figure 2–7 shows an example of a cabinet with the stabilizer foot ❶ extended.

1. Pull both equipment slides ❷ out fully to their locked positions.
2. Lift the chassis ❸ and position it so that you can insert the slide races into the front end of the slides.
3. Push the system into the slides until it stops. Then push down on the two slide locks, and then push the system into the cabinet.
4. Tighten the screws that fasten the system to the rails.

Figure 2–7 Installing the System on the Slides

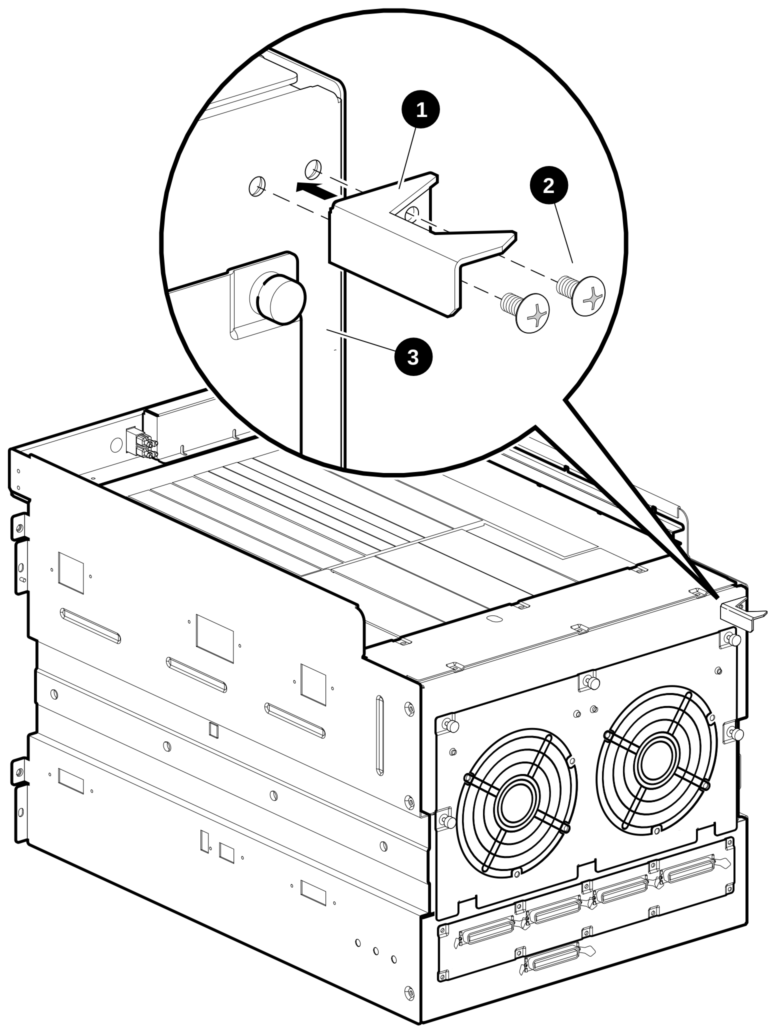


Installing the Interlock Actuator Bracket

The interlock actuator bracket prevents cabinet instability by allowing only one system at a time to be pulled out of the cabinet. Install the interlock actuator bracket if the system cabinet has an interlock system.

Figure 2–8 shows how to mount the interlock actuator bracket. Mount the interlock actuator bracket ➊ at the rear of the system ➋ using two M4 10 mm screws ➌.

Figure 2–8 Installing the Interlock Actuator Bracket

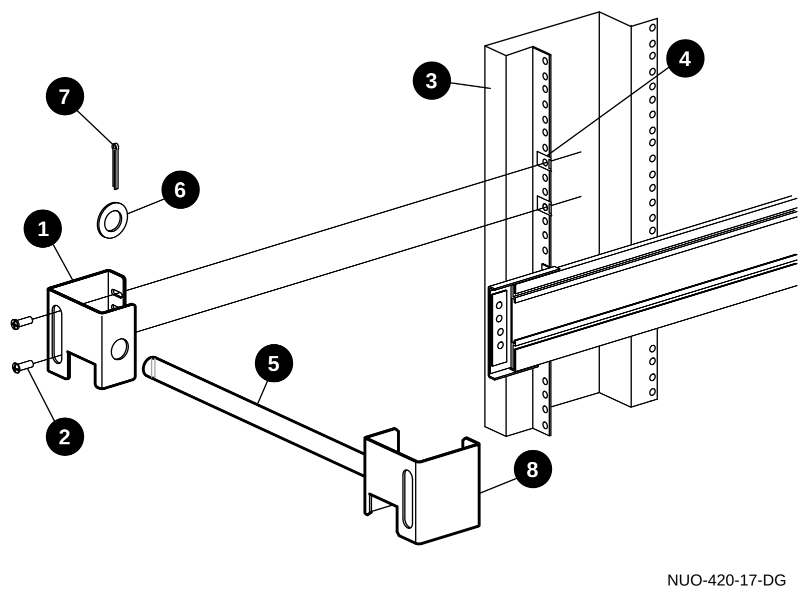


Installing the Cable Management System

To install the cable management system, refer to Figure 2–9, and proceed as follows:

1. Slide the system into the rack.
2. Locate the second rear rail ❸ mounting holes that are just below the top rear edge of the system chassis.
3. Align the top hole of the cable management bracket ❶ with the rear rail ❸ mounting hole identified in step 2. Then install the cable management bracket using two hex head 10-32 screws ❷ and two U-nuts. ❹.
4. Align the top hole of the cable management bracket ❽ with the rear rail mounting hole identified in step 2. Then install the cable management bracket using two hex head 10-32 screws and two U-nuts.
5. Insert one end of the 1-inch tubing ❺ into the cable management bracket ❶ and slide the other end into the cable management bracket ❽.
6. To prevent the tube from sliding out of the brackets ❶❽, slide a flat washer ❻ on to each end of the tube just past the cotter pin hole. Then install a cotter pin ❼ into each hole.

Figure 2–9 Installing the Cable Management System



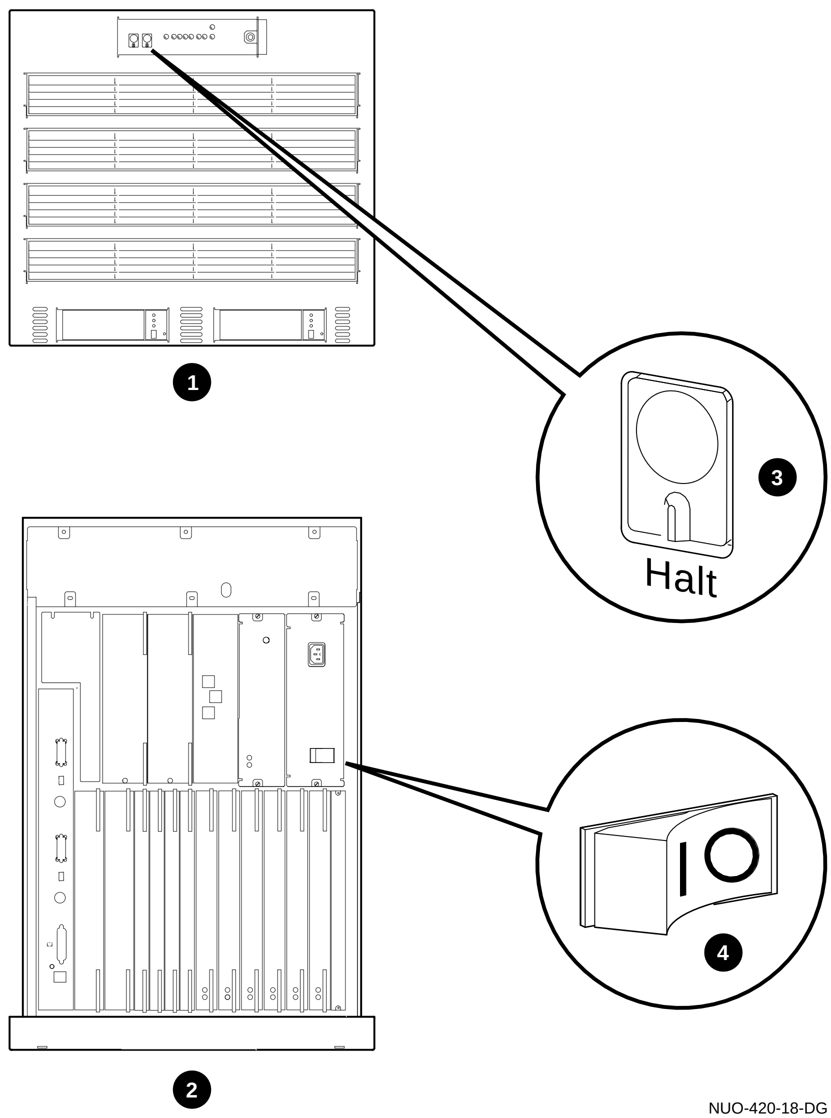
❶ Cable management bracket (74-46815-01)
❷ Hex head 10-32 screws (90-00061-46)
❸ Rear rail
❹ U-nut (90-07786-00)
❺ 1-inch tubing (74-46816-01)
❻ Flat washer (90-10010-00)
❼ Cotter pin (90-11366-01)
❽ Cable management bracket (74-46815-02)

Preparing the System for Operation

Checking the Switch Settings

Figure 2–10 shows the location of the switches on the front of the system ❶ and on the top of the system ❷. Ensure that the Halt switch ❸ is set to the in position. Also be sure that the ac circuit breaker ❹ is set to OFF (O).

Figure 2–10 Switch Locations



Connecting the Console Terminal and Modem

Refer to the documentation that is shipped with the terminal for information on how to connect the keyboard and set up the console. Make sure that the console baud rate is set to 9600.

Note

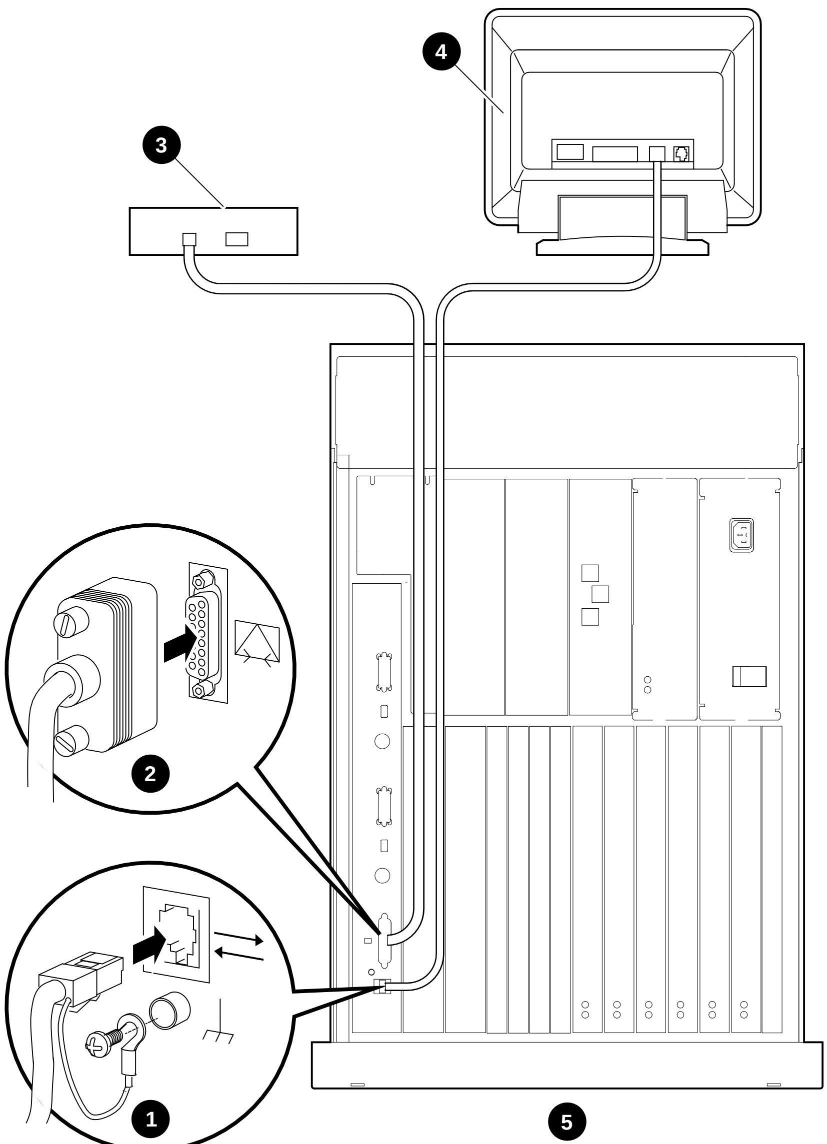
Use the cord shipped with the system, not the one shipped with the console terminal.

If you need to change the system baud rate, refer to Chapter 9.

If you have a modem, connect it now. Figure 2–11 shows the console terminal and modem connections.

❶ Connection of console terminal
❷ Connection of optional modem.
❸ Optional modem
❹ Console terminal
❺ Top of system

Figure 2–11 Modem and Console Connections



Connecting the Power Cords

Warning

To avoid risk of injury, do not remove modules, storage devices, or power supply. No user-serviceable parts are inside. Refer servicing questions to a Digital service representative or qualified self-maintenance personnel.

This equipment is not designed for connection to an IT power system (a power system without a directly grounded neutral conductor).

Plug this equipment into a properly grounded power receptacle.

The green fastener is a Safety Earth Bonding Point. Do not attempt to loosen.

Voltage selection is not required.

The power connections are shown in Figure 2–12.

❶ System, top view

❷ AC power port connection

❸ AC power cord

❹ Active wall outlet (20 A)

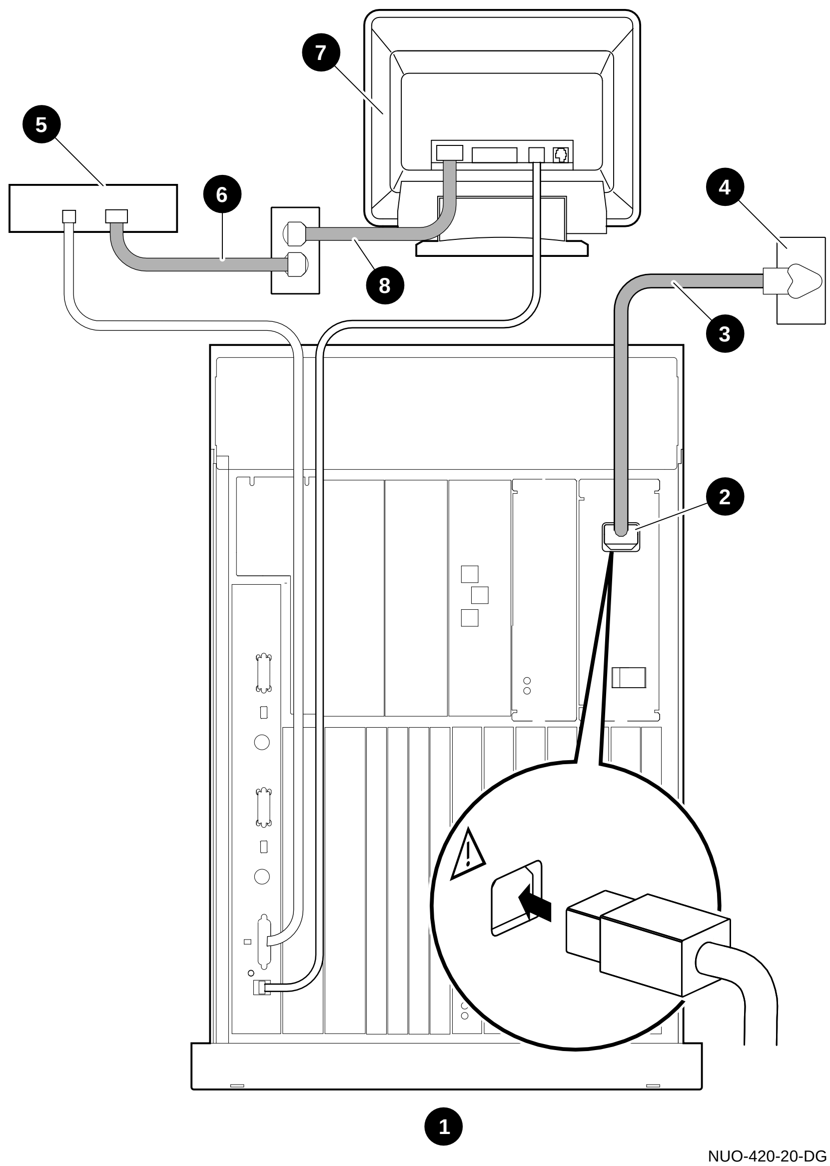
❺ Modem

❻ Modem power cord

❼ Console terminal

❽ Console terminal power cord

Figure 2–12 Power Connections



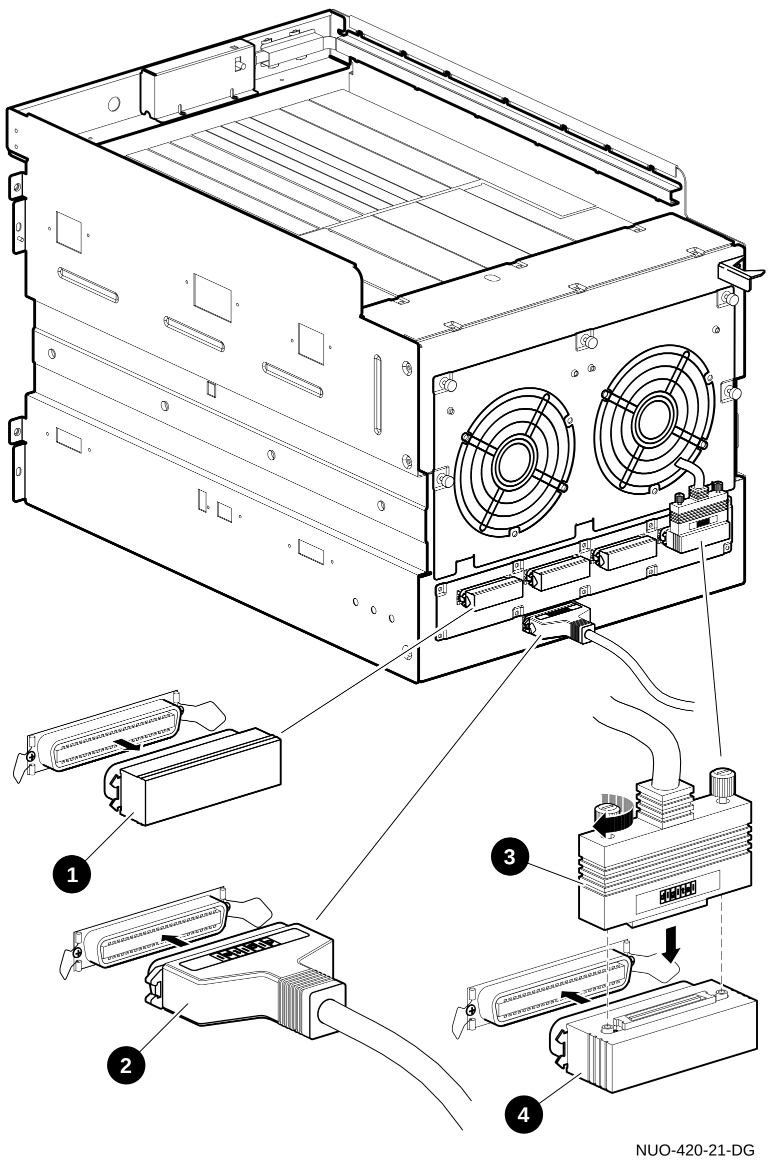
Expanding the System

The Rackmount DEC 4000 system can be expanded from any of the five ports on the rear of the system. These ports are labeled A-E. Ports A-D are the four top ports (left to right) as shown in Figure 2–13; these are SCSI/DSSI ports. Port E is the bottom port, and is SCSI only. Depending on your order, your system may differ from the example shown in Figure 2–13.

Figure 2–13 shows:

- SCSI terminator ❶ connection to port A
- SCSI cable ❷ connection to port E
- DSSI adapter ❹ on port D
- DSSI cable connecton ❸ to port D

Figure 2–13 SCSI and DSSI Connections



Turning On the System

Turn the system on in the following order:

1. Uninterruptable power supply UPS (optional)
2. Console terminal
3. Peripherals, expanders, and modems
4. AC circuit breaker (top of system)

After about a minute, you will see two displays similar to those shown in Figure 2–14 and Figure 2–15.

Figure 2–14 Displays

```
            08:52:07 Wednesday, July 29, 1992

            Digital Equipment Corporation
                      DEC 4000

            Executing Power-Up Diagnostics

  CPU    Memory    Storage      Net    Futurebus+
  0 1    0 1 2 3   A B C D E    0 1    1 2 3  4 5 6

  P -    - - - P   -  - - - -   * *    - - - - - -

*Test in progress    P  Pass    F  Fail    -  Not Present
```

NUO-420-22-DW

Figure 2–15 Displays

```
Console V2.3-2001          VMS PALcode X5.12B, OSF PALcode X1.09A

CPU 0             P B2001-AA DECchip (tm) 21064-2
CPU 1             -
Memory  0         -
Memory  1         -
Memory  2         -
Memory  3         P B2002-BA 32 MB
Ethernet 0        P Address 08-00-2B-2A-D4-43
Ethernet 1        P Address 08-00-2B-2A-EC-7D

                     ID 0    ID 1    ID 2    ID 3    ID 4    ID 5    ID 6    ID 7
                    ------------------------------------------------------------
A SCSI            P  RZ26    RZ26            RZ26                            Host
B SCSI            P  RZ26    RZ26    RZ26    RZ26                            Host
C SCSI            P  RZ26    RZ26    RZ26    RZ26                            Host
D                 P
E SCSI            P  TLZ06   RRD42   RZ26    RZ26    TZ85    RZ73    RZ73    Host
Futurebus+        P    -       -       -       -       -       -       -

System Status Pass       Type "b" to boot dka0.0.0.1.0

DEC 4000 console V2.3-2001, built on July 29, 1992 at 10:02:19
>>>
```

NUO-420-23-DW

Installing the Software

If your system includes an internal disk drive pre-loaded with operating system software, then:

If you ordered . . .	Refer to . . .
OpenVMS Alpha AXP	*Open VMS Factory Installed Software User Information*, provided with your system.
DEC OSF/1 Alpha AXP	*Guide to Starting the Factory Installed Software System*, provided with your system.

If you need more detail, or you plan to install from compact disc, use the OpenVMS or DEC OSF/1 installation guide that comes with your operating system software.

For more information on your hardware or console diagnostics:

When you need . . .	Refer to . . .
Console user information System configuration SCSI drive removal and replacement System troubleshooting	This guide
Power-up diagnostics Running diagnostics Symptom-directed diagnostics System repair and replacement System configuration	*DEC 4000 AXP Model 600 Series Service Guide*
Information on additional options available	*DEC 4000 Options Guide*
CPU operation Memory operation I/O operation System operation	*DEC 4000 Model 600 Series Technical Manual*

Connecting to the Network

There are three networking options: ThinWire, standard Ethernet (thickwire), and 10BASE-T Ethernet. Depending on the type of network you have, follow the instructions in Figure 2–16, Figure 2–17, or Figure 2–18 to make the connection.

❶ Remove the T-connector and terminator (save the terminator).

❷ Make sure that the Ethernet select switch is positioned toward the ThinWire connector.

❸ Connect ThinWire cable and reconnect T-connector.

❹ System, top view

Figure 2–16 Option 1: ThinWire Ethernet Connection

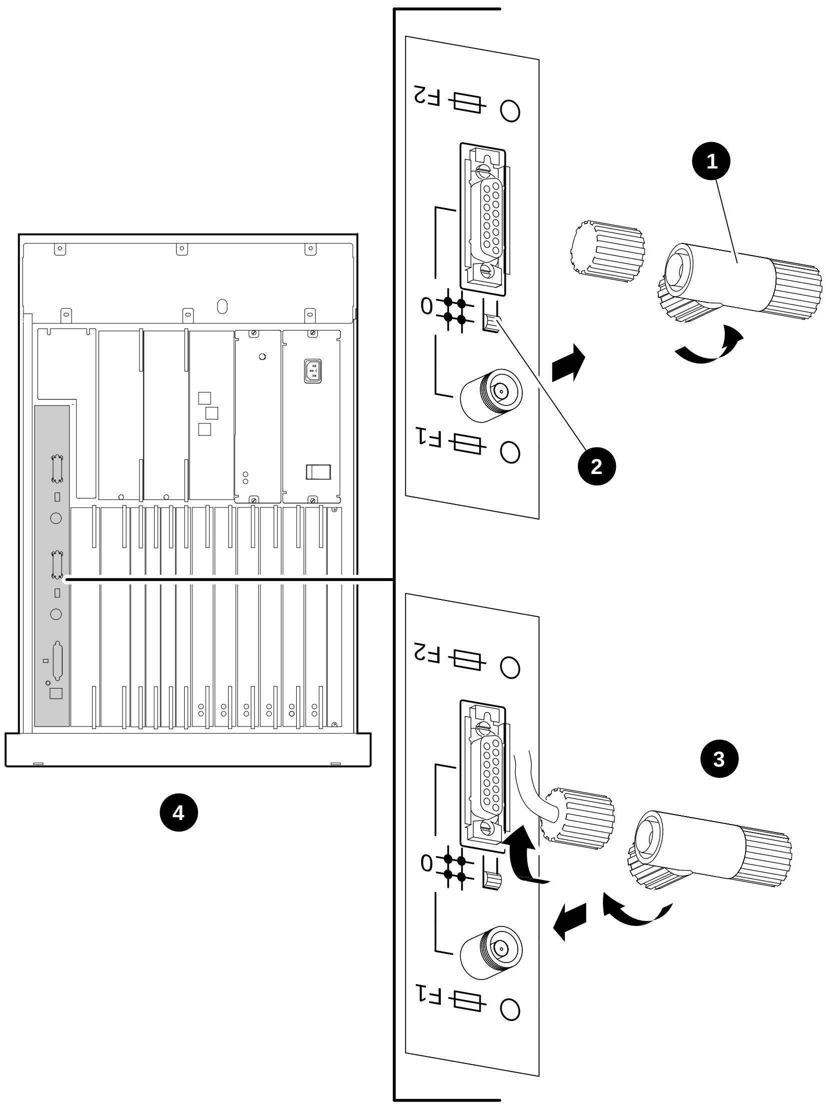
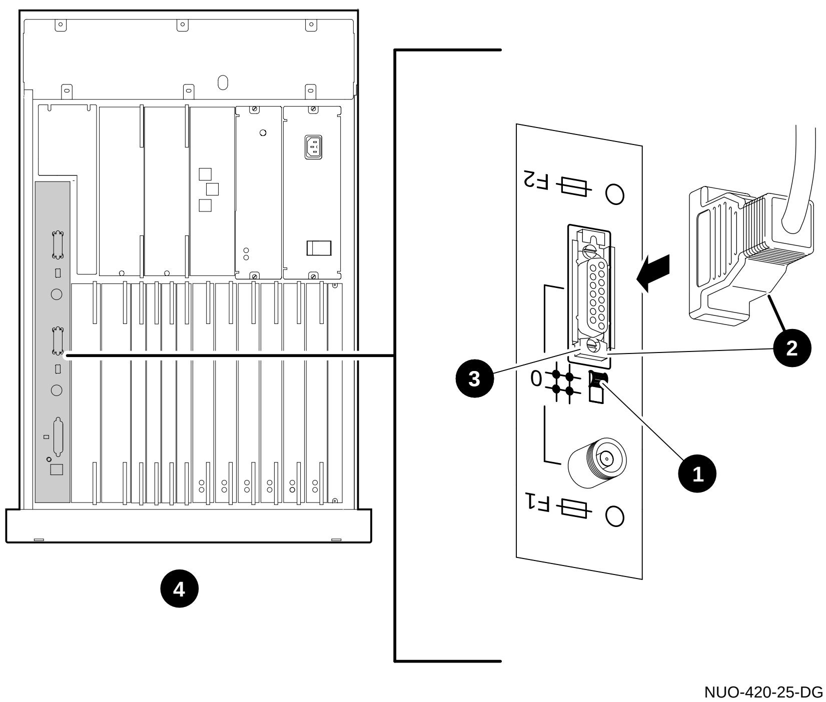
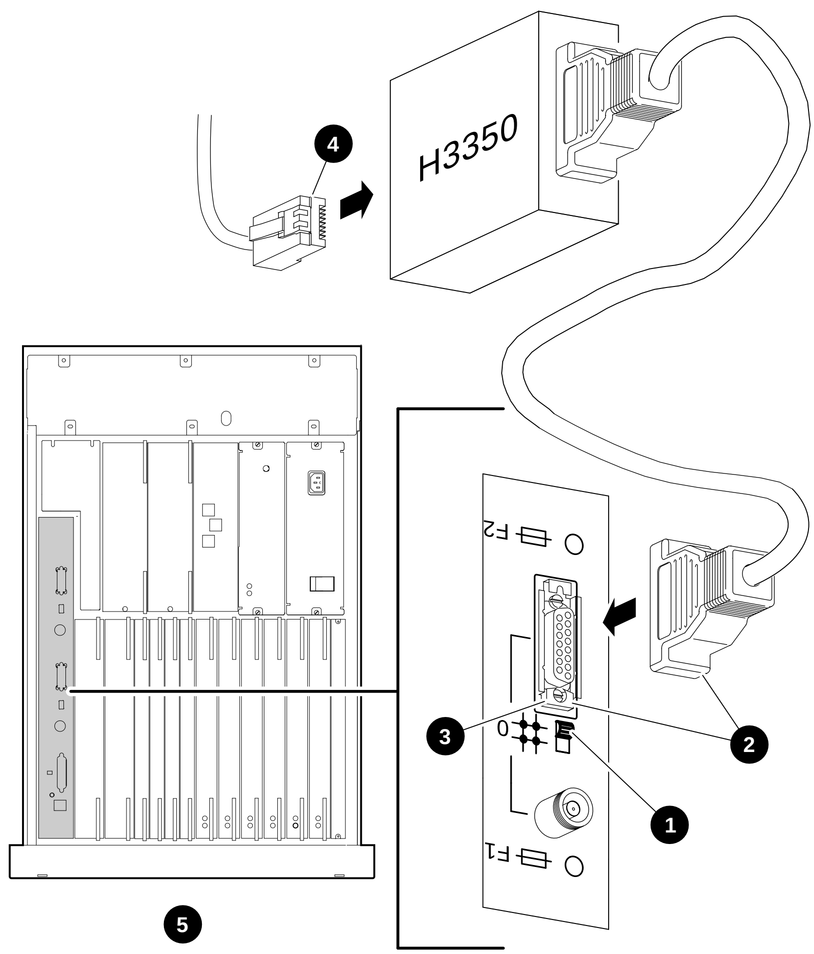


Figure 2–17 Option 2: Standard Ethernet, Thickwire Connection



❶ Slide Ethernet select switch toward 15-pin D-sub connector.
❷ Connect transceiver cable.
❸ Slide latch toward the Select switch.
❹ System, top view

Figure 2–18 Option 3: 10BASE-T (Twisted-Pair) Connection



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1. Slide Ethernet select switch toward 15-pin D-sub connector.
2. Insert transceiver cable.
3. Slide latch toward the Select switch.
4. Connect 10BASE-T (twisted-pair) cable.
5. System, top view

3

System Operation

Chapter Description

In This Chapter

This chapter covers the following information:

- Modes of Operation
- Starting the System
- Using the Operator Control Panel
- Help

Modes of Operation

Two Modes of Operation

The system can run in one of two environments:

- Console mode
- Operating system mode

Console Mode

In console mode, the system and the console terminal operate under the control of the console subsystem. All user input is passed to the console subsystem.

The system runs in console mode under two circumstances:

- The system is powered up and operating system software has not been booted.
- Operating system software has been shut down or has crashed.

Chapter 4 describes how to use the system in console mode.

Operating System Mode

In operating system mode, the system and console terminal are under control of the operating system. All user input is passed to the operating system.

The system runs in operating system mode if the system is powered up and operating system software is running uninterrupted.

Once you complete the steps described in Starting the System your system will be running in operating system mode. Refer to your operating system documentation for information about using the system in operating system mode.

Starting the System

Before You Start the System

You start a system by bringing it from a powered-down state to the point at which the operating system login banner is displayed on the console terminal.

Before starting the system, you should be familiar with system components, lights, and controls. Use the diagrams on previous pages to familiarize yourself with these features.

When to Start the System

Your system may already be started. If the operating system login banner or prompt is displayed on your console terminal, the system is already started. Skip this section and proceed to the next section in this chapter, Using the Operator Control Panel .

If the console prompt (>>>) is displayed on your console terminal, the system is in console mode. To finish starting the system, set environment variables (described in Chapter 6) and boot operating system software (described in Boot Operating System Software, in this chapter).

Overview of the Task

Start the system by performing the following steps:

1. Power up external devices
2. Power up the system
3. Set environment variables
4. Boot operating system software

Once the system is booted, you can begin normal operation.

Power Up External Devices

Begin starting your system by powering up external devices, which may include the following:

- Uninterruptable power supply (UPS) (optional)
- Console terminal
- Local printer (optional)
- Standalone external devices (optional)

Refer to the device's installation instructions for information about powering up that device.

Power Up the System

Power up your system as follows:

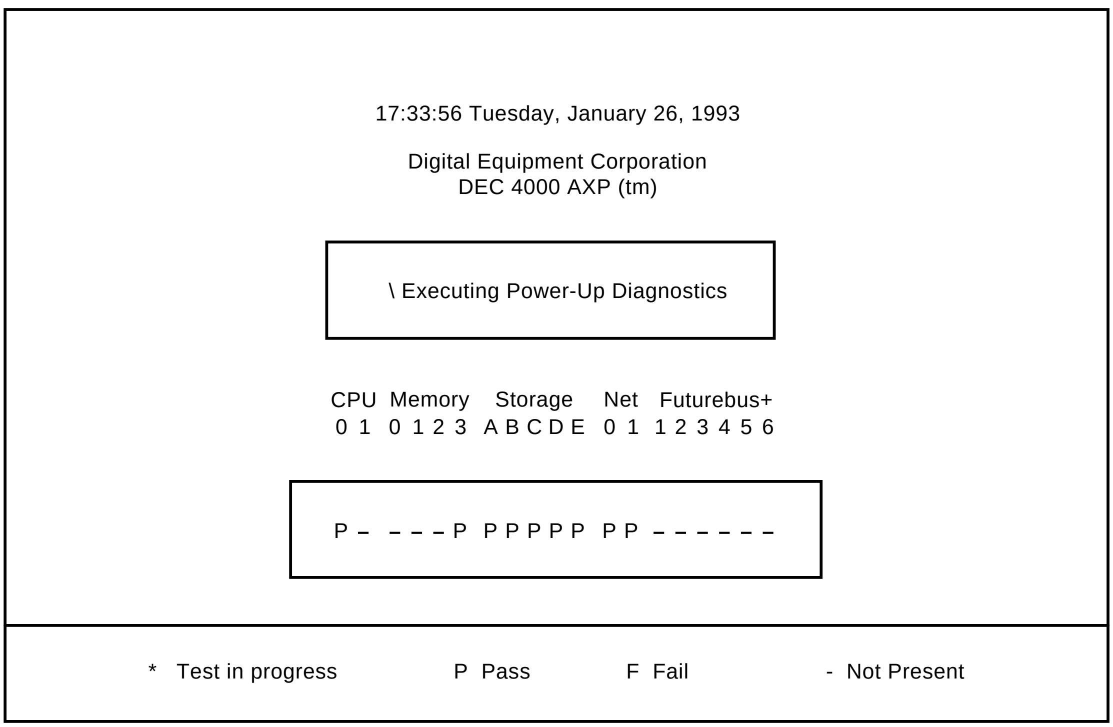
Step	Action
1	Find the ac circuit breaker at the top of the system. Press the switch to the ON (|) position. The ac power light comes on. Each light on the control panel comes on briefly and then goes off.
2	Check the display on the console terminal screen: • If the startup screens (Figure 3–1 and Figure 3–2) are displayed, either set environment variables or boot the operating system. • If the booting system software screen (Example 3–1 or Example 3–2) is displayed, your system has begun booting operating system software. After several minutes, the operating system login banner is displayed. Log in to the system at the login prompt. You are ready to begin normal operation once the operating system prompt is displayed.

If You Have a Problem

If any of the steps in the preceding procedure do not work as stated, go to Chapter 11 for troubleshooting information.

Figure 3–1 shows an example of a system startup screen during self-tests. The screen shows the status and result of the self-tests.

Figure 3–1 System Power-Up Self-Test Screen



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When the power-up self-tests are completed, a second screen similar to the one shown in Figure 3–2 is displayed. This screen provides configuration information for the system.

Figure 3–2 Sample Power-Up Configuration Screen

```
CPU 0         P     DECchip™ 21064 PALcode Xn.nn, Firmware Tn.n-nnnn
CPU 1         -
Memory 0      -
Memory 1      -
Memory 2      -
Memory 3      P     B2002-DA 128 MB
Ethernet 0    P     Address  08-00-2B-2A-D6-97
Ethernet 1    P     Address  08-00-2B-2A-D6-A6

                    ID 0   ID 1   ID 2   ID 3   ID 4   ID 5   ID 6   ID 7
                    -------------------------------------------------------
 A   SCSI     P     RZ73                                              Host
 B   DSSI     P     RF73                                              Host
 C   DSSI     P                                                       Host
 D   DSSI     P                                                       Host
 E   SCSI     P     TZ85                        TLZ06                 Host
Futurebus+    P            -      -      -      -      -      -

System Status Pass             Type b to boot

>>>
```

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Set Environment Variables

Before you boot operating system software, you may want to set or change the setting of some environment variables. By customizing the setting of the system's environment variables, you can control how the system powers up and boots operating system software in the future.

For example, you can do the following:

- Set the default system startup action to boot. If the startup action is set to boot, the system will automatically boot operating system software when you power up or reset the system.
- Set or change the default boot device.

In most cases, some environment variables on your system were preset when your system shipped from the factory.

For information about setting environment variables and the values to which environment variables have been preset, refer to What Variables Can I Set? in Chapter 6.

Boot Operating System Software

Boot operating system software as follows:

Step	Action
1	Enter boot or b at the console prompt. `>>> b` A booting system software screen (Example 3–1 or Example 3–2) is displayed on your console terminal. After several minutes, the operating system login banner is displayed on your console terminal.
2	Log in to the system at the login prompt. You are ready to begin normal operation once the operating system prompt is displayed.

Boot and b are abbreviations of the `boot` command. When you enter either of these abbreviations, the value of an environment variable (shown in parenthesis) provides the following additional information during booting:

- Boot device (bootdef_dev)
- Boot flags (boot_osflags)

For information about setting or displaying the current value for either of these environment variables, refer to Chapter 6.

For complete information about the `boot` command, refer to boot in Chapter 5.

Example 3–1 shows a system booting OpenVMS AXP software.

Example 3–1 Booting OpenVMS AXP System Software Screen

```
OpenVMS AXP Version 1.0 Major version id = 1 Minor version id = 1

%SYSINIT-I-start
%SYSINIT-I-finish
                OpenVMS AXP V1.0 Installation Procedure

                         Model: DEC 4000 Model 610
                 System device: RZ57 - _DKIO:
                   Free Blocks: 1804734
                   System type: 01


* Please enter the date and time (DD-MMM-YYYY HH:MM)22-OCT-1992 15:21
STDRV-I-STARTUP, VMS startup begun at 22-OCT-1992 15:21:00.13
%SET-I-NEWAUDSERV, identification of new audit server process is 00000027
%%%%%%%%%%%  OPCOM 22-OCT-1992 15:21:21.83  %%%%%%%%%%%
```

Example 3–2 shows a system booting DEC OSF/1 AXP software.

Example 3–2 Booting DEC OSF/1 AXP System Software Screen

```
(boot dka0.0.0.0.0 -flags 0)
block 0 of dka0.0.0.0.0 is a valid boot block
reading 16 blocks from dka0.0.0.0.0
bootstrap code read in
base = 1f2000, image_start = 0, image_bytes = 2000
initializing HWRPB at 2000
initializing page table at 1e4000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

Alphaboot - Wed May 13 16:29:59 EDT 1992

OSF boot - Sat May 9 08:43:49 EDT 1992

Loading vmunix ...
```

Using the Operator Control Panel

Before You Use the Control Panel

Once the operating system is running, pressing a control panel button or switch interrupts operation. Before you press a control panel button or switch, you may need to shut down the system.

You shut down the system by performing the operating system software shutdown procedure. Refer to your operating system documentation.

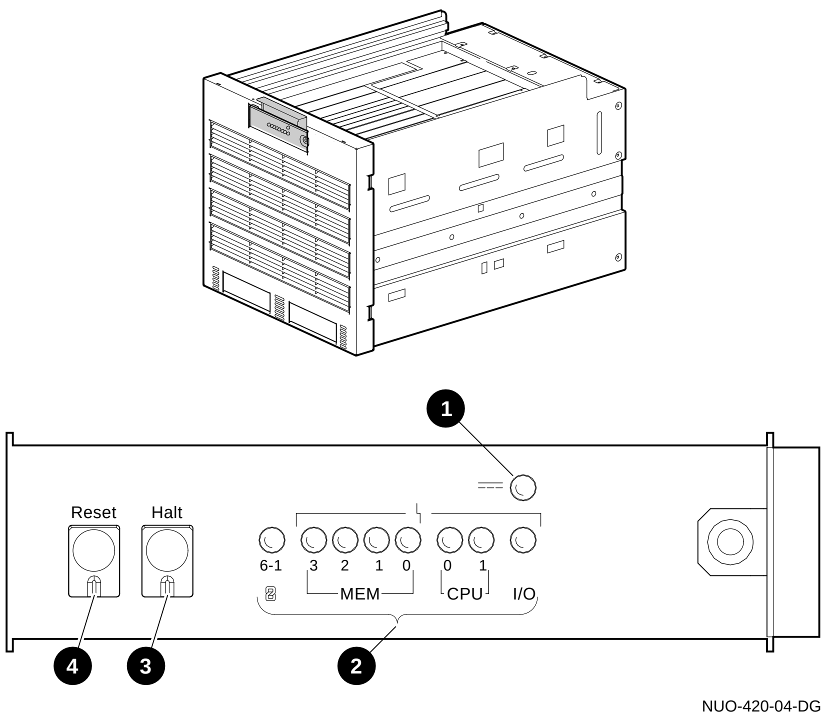
Overview

You can use the switches and buttons on the DEC 4000 AXP Rackmount control panel to do the following:

- Invoke console mode from operating system mode
- Reset a hung system
- Monitor self-test results

Use Figure 3–3 to locate the controls that are identified in the procedures on the following pages.

Figure 3–3 Operator Control Panel



❶ DC power light
❷ Self-test status lights
❸ Halt button
❹ Reset button

Invoke Console Mode

You may want to invoke console mode in order to set environment variables or to enter other console commands.

You use the Halt button (Figure 3–3) to invoke console mode from operating system mode on your console terminal. The system then halts.

For information about invoking console mode from a remote device or from a powered-down state, refer to Running the Console Program: Invoking Console Mode in Chapter 4.

Invoke console mode as follows:

Step	Action
1	Press the Halt button on the front of the system to the in position *or* do one of the following: • If the tta0_halts environment variable is set to 4 or 6, enter Break on the console terminal keyboard. • If the tta0_halts environment variable is set to 2 or 6, press Ctrl/P on the console terminal keyboard. The console mode prompt is displayed on the console terminal: >>>
2	The system is now in console mode. You can begin entering console commands.
3	If you invoked console mode by pressing the Halt button to the in position, press the Halt button to the out position.
4	To return to operating system mode, enter the `continue` command at the console prompt. If the system does not respond to the `continue` command, reboot by entering the `boot` command at the console prompt.

For general information about console mode, refer to Chapter 4. For information about setting environment variables, refer to Chapter 6.

Reset the System

Pressing the Reset button (shown in Figure 3–3) resets the system. The system aborts all current processes, initializes, and performs startup self-tests.

When the system is in console mode or in operating system mode, you use the Reset button, as a last resort, to reset the system if it hangs. (First, try pressing Ctrl/C or Ctrl/Y or entering other operating system commands before pressing the Reset button.)

Caution

Pressing the Reset button halts all system processes. Do not perform this procedure from operating system mode unless your system is hung and you have exhausted all other ways of terminating the process.

When you press the Reset button, the system will reset itself and perform system self-tests.

Reset a system as follows:

Step	Action
1	Press the Reset button on the control panel (Figure 3–3.) If the auto_action environment variable is set to boot and the bootdef_dev environment variable specifies the boot device, your system will perform a self-test and autoboot. Once you log in to the system, you can resume normal operation. It is not necessary to perform the next step. If not, proceed to the next step.
2	Return to operating system mode by entering the `boot` command at the console terminal prompt (>>>).

Power Down the System

You use the ac circuit breaker to power down the system.

Note

You rarely need to power down the system. You may be able to accomplish your task by pressing the Reset button (See Reset the System, earlier in this chapter.) For maximum reliability, Digital recommends that you run your system continuously.

Power down the system as follows:

Step	Action
1	Shut down the system using the shutdown procedure described in your system software manual.
2	Extend the system on the rails and press the ac circuit breaker at the rear of the system to the OFF position (0). See Chapter 12 for instructions on extending the system.
3	Power down external devices if you have them. Refer to the device installation guide.

Monitor Self-Test Results

You can use the self-test status lights (shown in Figure 3–3) to check the results of the system self-test.

The system performs its self-test when you reset the system (press the Reset button) and when you power up the system.

During the self-test, the system tests each module in the card cage. As a module is tested, the light representing that module on the operator control panel comes on. The light goes off when the test completes successfully.

If one or more of the self-test status lights remains on after the self-tests, refer to Chapter 11.

Help

Getting Help

Get help from the following sources:

- In console mode, access help by entering `help` or `man` at the console terminal prompt (>>>).
- In operating system mode:
  - If you are running OpenVMS AXP, enter `HELP` at the DCL prompt $.
  - If you are running DEC OSF/1 AXP, enter `man` and the command for which you wish to receive information.
- For information about other documentation that is available for your system, refer to the preface of this manual. It lists related documents and their order numbers.
- Contact Digital Services at the locations listed in the following table. If your Digital Services number is not listed, contact your local Digital office for assistance.

Country	Telephone Number
United States	1-800-354-9000
Canada	1-800-267-5251
Canada (Quebec)	1-800-267-2603
United Kingdom	[44]256 59200
France	[33]92955111
Germany	[49]-(89)-95913218

References

The following table describes where to find additional introductory information.

Task	Document
Prepare the system site	*DEC 4000 Model 600 Series Site Preparation Checklist*
Install the system	This guide
Install operating system software	Operating system software installation guide
Power up and power down external devices	Installation guide for the device
Shut down operating system software	• In OpenVMS AXP, refer to *OpenVMS Alpha Version 1.0 Upgrade and Installation Manual*. • In DEC OSF/1 AXP, refer to *DEC OSF/1 AXP Guide to System Administration*.
Troubleshooting	Chapter 11 of this manual and *DEC 4000 AXP Model 600 Series Service Guide*.

4

Console Subsystem

Chapter Description

What Is the Console Subsystem?

This chapter focuses on the console subsystem. The console subsystem provides the DEC 4000 AXP Rackmount user interface when operating system software is not running or is halted.

For example, you use the console subsystem:

- To boot operating system software.
- To set or display environment variables.
- To upgrade the firmware.
- To test your system.
- To modify DSSI or Fast SCSI parameters.

In This Chapter

This chapter covers the following information:

- Components of the Console Subsystem
- Running the Console Program: Invoking Console Mode
- Console Mode User Interface

Components of the Console Subsystem

Console Subsystem

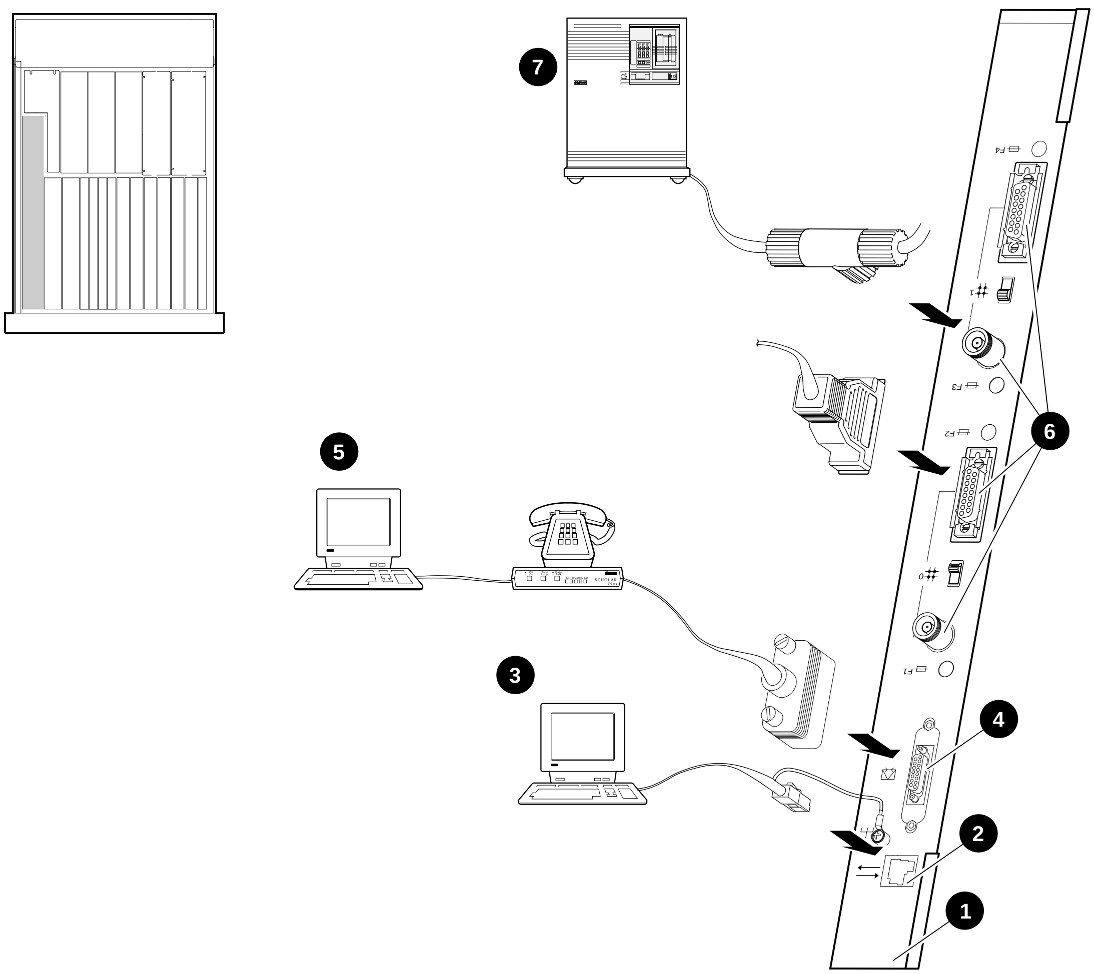
Figure 4–1 and the following list identifies the components of the console subsystem.

- *Console program* — is the software that executes when operating system software is not executing; it provides the user interface, interprets and executes user commands.

  When the console program is executing, the system is running in *console mode*.

- *I/O module* ❶ — is the module in the card cage at the top of the system.
- *Console terminal port* ❷ — connects the console terminal to the system; it is located on the I/O module.
- *Console terminal* ❸ — is used exclusively for entering console commands when the console program is executing. It connects to the console terminal port on the I/O module.
- *Auxiliary serial port* ❹ — connects the remote access device, which can function as a remote console device to the system. It is located on the I/O module.
- *Remote access device* ❺, ❼ — is the external hardware, possibly at a remote site, that can act as a console terminal.
- *Ethernet port* ❻ — connects the console subsystem to an Ethernet network. Devices on this network can function as remote access devices. Depending on the type of system you ordered, one or two Ethernet ports are located on the I/O module.

Figure 4–1 Console Subsystem



Running the Console Program: Invoking Console Mode

Overview

You can invoke console mode on the system through the following devices:

- Console terminal
- Remote access device: either a device connected to the auxiliary serial port on your system's I/O module or a device that is on the same Ethernet segment as the system.

From the Console Terminal

The system's console terminal is the terminal that is plugged in to the system's console terminal port on the I/O module at the rear of the system.

From a powered-down state, invoke console mode from the console terminal as follows:

Step	Action
1	Press the Halt button on the control panel to the in position.
2	Power up the system (described in Chapter 3). After the system performs a self-test, the console prompt (>>>) displays on the console terminal.
3	Press the Halt button on the control panel to the out position.
4	You can begin entering console commands.
5	To continue to operating system mode, refer to Boot Operating System Software in Chapter 3.

For information about invoking console mode from operating system mode, refer to Invoke Console Mode in Chapter 3.

From the Auxiliary Serial Port

One way to access your system from a remote site is through a device at the remote site that is connected to your system's auxiliary serial port on the I/O module at the rear of the system.

When your system is running in operating system mode, you can access console mode from this remote access device as follows:

1. Set host to your system from the remote access device.
2. Shut down the operating system or:

   If the tta1_halts environment variable on your system is set to 2, press Ctrl/P on the remote access device keyboard.

For information about setting the tta1_halts environment variable, refer to Enabling Halt Key Functions (tta0_halts and tta1_halts) in Chapter 6.

From Across the Ethernet

Another way to access your system from a remote site is through the Ethernet. You can connect to your DEC 4000 AXP Rackmount system from any device that is on the same Ethernet segment, or local area network (LAN).

Accessing your system from across the Ethernet differs depending on whether your system is in console or operating system mode.

In Operating System Mode

If your system is in operating system mode, access console mode from this remote device as follows:

1. Set host to your system using the protocol appropriate to your network device, possibly DECnet or MOP. Refer to your operating system documentation for information about the appropriate protocol for your system.
2. Shut down the operating system. Refer to your operating system documentation for instructions.

   As the operating system shuts down, you will lose the connection to your system.
3. Under the OpenVMS AXP operating system, reconnect to your system using the instructions that follow.

In Console Mode

Note

If your system crashed during operation, the MOP drivers will not be running, and you will not be able to access your system using the method described in this section.

If your system is in console mode, access it as follows:

If you are running OpenVMS AXP software, set host to your system using the `ncp connect` command and the MOP protocol. For example:

```
$ MCR NCP
NCP> CONNECT VIA device-name physical address ethernet-address
```

For information about the `ncp connect` command, refer to the *DECnet for OpenVMS AXP Network Management Utilities Manual*.

Console Mode User Interface

Console Prompt

The console mode prompt is:

```
>>>
```

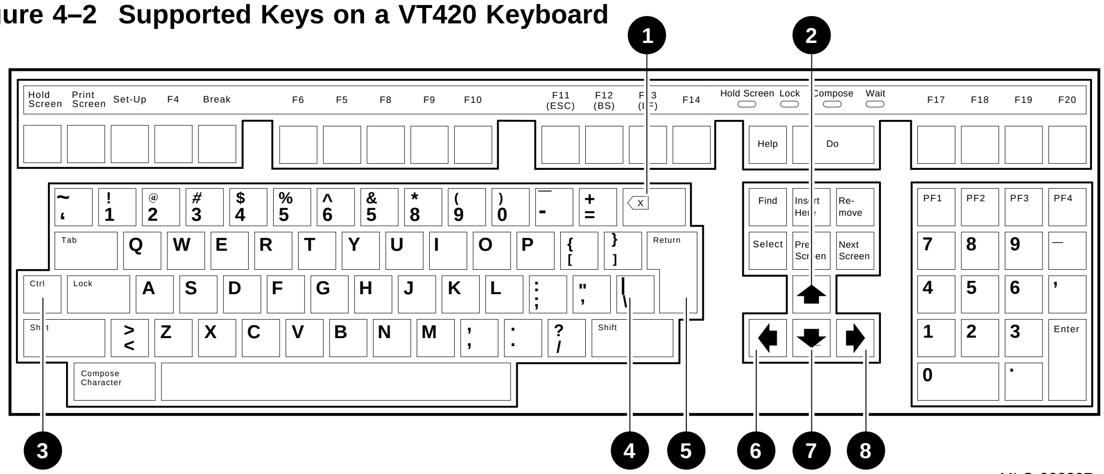
You can enter supported keys, control characters, and console commands at the console prompt.

Keyboard Characters

Figure 4–2 shows the keyboard characters that are supported in console mode. Some DEC 4000 AXP Rackmount systems come with a VT420 terminal and keyboard. However, you can enter the following keyboard characters in console mode, regardless of your terminal type.

Callout	Key	Function
❶	⌫	Deletes the last character you entered. With a hardcopy terminal, ⌫ is echoed with \ followed by the character being deleted. If you delete several characters consecutively, the system echoes with \, the deleted characters, followed by another \ at the end of the series.
❷	↑	Recalls up to 32 previous commands.
❸	Ctrl	Begins a control character.
❹	\ (Backslash)	Extends a command onto the next line. Must be the last character on the line to be continued.
❺	Return	Enters a command on the command line. The cursor need not be at the end of the command line.
❻	←	Moves the cursor left one position.
❼	↓	Reverses the order of recalled commands after using ↑.
❽	→	Moves the cursor right one position.

Figure 4–2 Supported Keys on a VT420 Keyboard



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Control Characters

Enter control characters by holding down the key labeled Ctrl while pressing another key. You can enter the following control characters in console mode:

Character	Function
Ctrl/A	Toggles between insertion and overstrike mode so you can edit text on the current command line. Default mode is overstrike.
Ctrl/C	Interrupts a command process and returns control to the console command line.
Ctrl/E	Moves the cursor to the end of the line.
Ctrl/H	Moves the cursor to the beginning of the line.
Ctrl/O	Suppresses output to console terminal until you enter Ctrl/O again. Output is also re-enabled when the console prompts for a command, issues an error message, or enters operating system mode.
Ctrl/S	Suspends output to the console terminal until you enter Ctrl/Q.
Ctrl/Q	Resumes output to the console terminal that you suspended with Ctrl/S.
Ctrl/U	Deletes the entire line. Line deletion is followed with a carriage return, line feed, and a new prompt.
Ctrl/R	Redisplays the current line, omitting deleted characters.

5

Console Commands

What Are the Console Commands?

In This Chapter

The previous chapter describes the console subsystem. This chapter covers the console commands.

Levels of Commands

There are two levels of console commands:

- Basic
- Comprehensive

Basic Commands

Most of the time, you will use the basic console commands. All of the basic console commands are described in alphabetical order in this chapter. Table 5–1 lists the basic console commands.

Table 5–1 Basic Console Commands

Command	Syntax	Description
boot	boot [-flags [*longword*,]*longword*] [-halt] [*boot_device*]	Boots the operating system.
cdp	cdp [-{a,i,n,o,u}] [-sn] [-sa *allclass*] [-su *unitnum*] [*dssi_device*]	Configures DSSI drive IDs.
continue	continue	Resumes program execution.
date	date [*yyyymmddhhmm.ss*]	Displays or sets the current date and time.
help	help [*command* . . .]	In OpenVMS AXP, displays online help using console commands.
init	init	Initializes the system.
man	man [*command* . . .]	In DEC OSF/1 AXP, displays online help using console commands.
set	set [-default] *envar val*	Sets an environment variable.
set host	set host [-dup] [-task *task_name*] *device*	Sets host to another MSCP DUP server on a DSSI device.
show	show [*envar*] [{config,device,memory, pal, version}]	Displays the value of an environment variable or displays configuration information.
test	test	Tests the system and displays results.

Comprehensive Commands

It should rarely be necessary for you to enter comprehensive console commands. Using these commands requires detailed knowledge of your system. Do not use these commands without fully understanding the effect they can have on your DEC 4000 AXP Rackmount system.

To see a list of the comprehensive commands, enter `help` or `man` at the console prompt.

For information about comprehensive console commands, refer to the *DEC 4000 Model 600 Series Technical Manual*.

Entering Console Commands

New Console Commands

The DEC 4000 AXP Rackmount system features new console commands. Most of the DEC 4000 AXP Rackmount console commands are similar, but not identical to, the console commands supported on VAX systems. (See Table 5–2.) If you are familiar with VAX console commands, familiarize yourself with the new commands before proceeding.

Table 5–2 Differences Between VAX and DEC 4000 AXP Rackmount Console Commands

VAX Console Command	DEC 4000 AXP Rackmount Console Command
set boot	set bootdef_dev
show boot	show bootdef_dev
show bflags	show boot_osflags
/*qualifier* (indicates optional qualifiers)	-*flag* (indicates optional flags)

Console Command Format

Enter a console command in the following format. To specify a flag, you must precede the flag with a space and a hyphen.

`>>>` *`command`* `[-flags] [parameters..]`

For information about entering a specific console command, refer to the console command reference pages, in the next section of this chapter.

Online Help

Once the system is running in console mode, get online information about console commands by entering `help` or `man` at the console terminal.

This book documents only basic console commands. Online help, however, provides information for the complete list of console commands.

How to Display Output One Page at a Time

The `help` and `show` commands instruct the system to display information. When information fills more than one screen, the information scrolls until all information has been displayed.

To make the system output easier to read, you can use the `more` command to display the output one screen at a time. Enter `| more` after the command you are entering. For instance:

```
>>> help | more Return
```

The system responds with the following display:

```
NAME
        help or man
FUNCTION
        Display information about console commands.
SYNOPSIS
        help or man [<command>...]
                Command synopsis conventions:
                <item> Implies a placeholder for user specified item.
                <item>... Implies an item or list of items.
                [] Implies optional keyword or item.
                {a,b,c} Implies any one of a, b, c.
                {a|b|c} Implies any combination of a, b, c.

The following help topics are available:
alloc           bin             boot            build           cat
cbcc            cdp             check           chmod           chown
clear           cmp             continue        crc             date
deposit         dynamic         echo            edit            eval
examine         exer            exer_read       exer_write      exit
fbus_diag       find_field      free            grep            hd
help or man     init            io_test         kill            kill_diags
line            ls              memexer         memexer_mp      memtest
net             netexer         nettest         ntlpex          ps
--More--
```

From the `more` prompt, you can proceed either one line or one screen at a time as follows:

- To proceed one line at a time, press the Return key.
- To proceed one page at a time, press the space bar on the console terminal keyboard.

The remainder of this chapter describes the basic console commands.

boot

Synopsis

Bootstrap the system.

boot [-flags [*longword*,]*longword*] [-halt] [*boot_device*]

Description

Initializes the processor, loads a program image from the specified boot device, and transfers control to that image.

If you specify a list of devices, a bootstrap is attempted from each device in order. Then control passes to the first successfully booted image. In a list, always enter network devices last, since network bootstraps only terminate if a fatal error occurs or an image is successfully loaded.

The -flags option can pass additional information to the operating system about the boot that you are requesting.

You can abbreviate the `boot` command by entering `boot` or `b`. When you enter either of these abbreviations, an environment variable (shown in parenthesis) provides a default value for the following information:

- Boot device (bootdef_dev)
- Boot flags (boot_osflags)

If you specify the boot device or boot flags on the command line, the current default value is overridden for the current boot request. However, the corresponding environment variable is not changed.

Parameters

Parameter	Description
boot_device	A device path or list of devices from which the console program attempts to boot, or a saved boot specification in the form of an environment variable. Use the `set bootdef_dev` command to define the default boot device.

Flags

Flag	Description
-flags [*longword*,] *longword*	Specifies additional information to the operating system. In OpenVMS AXP, specifies system root number and boot flags. In DEC OSF/1 AXP, specifies boot flags. Refer to Setting Boot Flags (boot_osflags) in Chapter 6 for a list of possible settings and their meanings. The default boot flag setting is null. Use the `set boot_osflags` command to change the default boot flag setting.
-halt	Forces the bootstrap operation to halt and invoke the console program once the image is loaded and page tables and other data structures are set up. Console device drivers are not shut down when this qualifier is present. Transfer control to the image by entering the `continue` command.

Examples

In the following example, an OpenVMS AXP system boots from the SCSI disk, dka0. If bootable software cannot be found on dka0, the system attempts to boot from Ethernet port, eza0. Boot flag settings are 0 and 1.

```
>>> boot -flags 0,1 dka0,eza0
```

In the next example, a DEC OSF/1 AXP system boots from the SCSI disk, dka0, using boot flag setting i.

```
>>> boot -flags i dka0
```

In the next example, the system boots from the SCSI disk, dka0, but remains in console mode. Subsequently, you can enter the `continue` command to transfer control to the operating system.

```
>>> boot -halt dka0
```

In the next example, the system boots from the default boot device. The console program returns an error message if a default boot device has not been set.

```
>>> boot
```

Reference

`set`, `show`

cdp

Synopsis

Configure DSSI parameters.

cdp [-{a,i,n,o,u}] [-sn] [-sa *allclass*] [-su *unitnum*] [*dssi_device*]

Description

The cdp command allows you to modify DSSI device parameters from the console terminal without connecting to a node's DUP server. The parameters that are modified are the DUP task parameters: NODENAME, ALLCLASS, and UNITNUM.

If you enter cdp without an option or target device, the system displays parameters for all DSSI devices in the system.

Parameters

Parameter	Description
dssi_device	Name of the DSSI device or DSSI controller. Only the parameters for this device or the devices on this controller will be modified.

Flags

Flag	Description
-a	Sets device allocation class, ALLCLASS.
-i	Selective interactive mode, for setting all parameters.
-n	Sets device node name, NODENAME (up to 16 characters).
-o	Overrides warning messages.
-u	Sets device unit number, UNITNUM.
-sa *allclass*	Sets the allocation class (ALLCLASS) for all DSSI devices in the system to the value specified.

Flag	Description
-sn	Sets the node name (NODENAME) for all DSSI devices in the system to either RFhscn or TFhscn, where h is the device host number (0), s is the device slot number (0), c is the device channel number (0..3), and n is the device node ID number (0..6).
-su *unitnum*	Sets the starting unit number (UNITNUM) for the first DSSI device in the system to the value specified. The unit number for subsequent DSSI devices will be incremented from this base.

Examples

In the following example, the system lists the DSSI parameters for all DSSI drives on the system.

```
>>> cdp
     ❶              ❷              ❸                ❹  ❺  ❻

pua0.0.0.0.0    ALPHA0     0411214901371      2  0  $2$DIA0
pua0.1.0.0.0    ALPHA1     0411214901506      2  1  $2$DIA1
pua0.2.0.0.0    ALPHA2     041122A001625      2  2  $2$DIA2
pua0.3.0.0.0    ALPHA3     0411214901286      2  3  $2$DIA3
>>>
```

❶ Storage adapter device name

❷ Node name (NODENAME)

❸ System ID (SYSTEMID)

❹ Allocation class (ALLCLASS)

❺ Unit number (UNITNUM)

❻ Operating system device name

In the next example, the system sets the starting unit number for the first dua device in the system to the number 10. In increasing increments of 1, each subsequent dua device is also assigned a new unit number.

```
>>> cdp dua* -su 10

pua0.0.0.0.0    ALPHA0     0411214901371      2  10  $2$DIA10
pua0.1.0.0.0    ALPHA1     0411214901506      2  11  $2$DIA11
pua0.2.0.0.0    ALPHA2     041122A001625      2  12  $2$DIA12
pua0.3.0.0.0    ALPHA3     0411214901286      2  13  $2$DIA13
>>>
```

In the next example, the node name for all DSSI devices in the system is set to RFhscn using the default naming scheme (see the description of the -sn flag).

```
>>> cdp -sn

pua0.0.0.0.0    RF0000     0411214901371      2  10  $2$DIA10
pua0.1.0.0.0    RF0001     0411214901506      2  11  $2$DIA11
pua0.2.0.0.0    RF0002     041122A001625      2  12  $2$DIA12
pua0.3.0.0.0    RF0003     0411214901286      2  13  $2$DIA13
>>>
```

In the next example, interactive editing mode is requested for the drive dua13, or RF0003 from the previous example. In the interaction that follows, the user sets the node name to ALPHA13, the allocation class to 1, and the unit number to 5.

```
>>> cdp -i dua13

pua13.3.0.0.0:
Node Name [RF0003]? ALPHA13
Allocation Class [2]? 1
Unit Number [13]? 5
>>>
```

Reference

Setting and Examining Parameters for DSSI Devices in Chapter 8.

continue

Synopsis

Resume program execution on the specified processor.

continue

Description

Continues execution on the specified processor, or the primary processor if a processor is not specified. The processor begins executing instructions at the address that is currently in the program counter. The processor is not initialized.

The `continue` command is only valid if you have not disturbed the system state and if you halted the system by one of two methods: either by pressing the Halt button on the operator control panel or by entering Ctrl/P on the console terminal.

Note

Some console commands, for example, `boot`, may alter the machine state so that program mode cannot be successfully resumed. If program mode cannot be successfully resumed, you may need to reset the system.

Examples

In the following example, a system is commanded to resume operating system mode.

```
>>> continue
```

In the next example, a system's second processor is commanded to resume operating system mode.

```
>>> continue &p1
```

date

Synopsis

Display or modify the current date and time.

date [*yyyymmddhhmm.ss*]

Description

Displays or modifies the current date and time. If you do not specify any arguments, the current date and time are displayed. If you specify arguments, `date` modifies the arguments that you specify in the time-of-year (TOY) clock.

To modify the time, specify at least four digits, those that represent the hour and minute (hhmm). Omitted fields are not modified. When you set the date, the day of the week is generated automatically.

Parameters

Parameter	Description
[*yyyymmddhhmm.ss*]	Specifies the date and time string consisting of decimal pairs: • *yyyy* (0000–9999) year • *mm* (01–12) month • *dd* (01–31) day • *hh* (00–23) hour, required when setting time • *mm* (00–59) minute, required when setting time • *ss* (00–59) second

Examples

In the following example, the system is commanded to display the current date and time.

```
>>> date
      23:29:10 Monday, May 11, 1992
```

In the next example, the year, month, date, hour, and minute are set on the system.

```
>>> date 199302260814
```

In the next example, the date and time are set on the system.

```
>>> date 121537
```

In the next example, the hour, minute, and second are set on the system.

```
>>> date 1620.05
```

help or man

Synopsis

Display information about console commands.

help or man [*command* . . .]

Description

The `help` command in OpenVMS AXP, and the `man` command in DEC OSF/1 AXP, displays basic information about the use of console commands when the system is in console mode.

With no options or arguments, the help command displays the complete list of commands for which you can receive help.

- If you enter a console command, the `help` command displays information about that command.
- If you enter the help argument after the `help` command, the `help` command displays general information about the DEC 4000 AXP Rackmount system's console commands and online help.

Parameters

Parameter	Description
command . . .	Commands or topics for which help is requested.

Examples

In the following example, the system is commanded to display the topics for which help is available.

```
>>> help
```

In the next example, the system is commanded to display help on all commands that begin with "ex".

```
>>> help ex
```

In the next example, the system is commanded to display help on the boot command.

```
>>> help boot
```

init

Synopsis

Initialize the system.

init

Description

Initializes the system. The system performs a software reset and executes the power-up self-tests.

Entering the `init` command is nearly equivalent to pressing the Reset button. The difference is that part of memory is not retested when you enter the `init` command.

Examples

In the following example, the system is initialized.

```
>>> init
...
```

man

See `help`.

set

Synopsis

Set or modify the value of an environment variable.

set [-default] *envar val*

Description

Sets or modifies the value of an environment variable. Environment variables are used to pass configuration information between the console and the operating system.

Parameters

Parameter	Description
envar	The environment variable to be assigned a new value. Refer to the list of commonly used environment variables below.
val	The value that is assigned to the environment variable. Either a numeric value or an ASCII string.

Flags

Flag	Description
-default	Restores an environment variable to its default value.

Environment Variables

Variable	Description
auto_action	Sets the console action following an error, halt, or power-up, to halt, boot, or restart. The default setting is halt.
bootdef_dev	Sets the default device or device list from which the system attempts to boot. For systems that ship with Factory Installed Software (FIS), the default device is preset at the factory to the device that contains FIS. For systems that do not ship with FIS, the default setting is null.

Variable	Description
boot_osflags	Sets additional parameters to be passed to system software. When using OpenVMS AXP software, these parameters are the system root number and boot flags. When using DEC OSF/1 AXP software, this parameter is boot flag. The default setting is null.
language	Sets the language in which system software and layered products will be displayed. The default setting may vary depending on where your system was manufactured. The codes for the languages are: 0 none (cryptic) 30 Dansk 32 Deutsch 34 Deutsch (Schweiz) 36 English (American) 38 English (British/Irish) 3A Espanol 3C Francais 3E Francais (Canadian) 40 Francais (Suisse Romande) 42 Italiano 44 Nederlands 46 Norsk 48 Portugues 4A Suomi 4C Svenska 4E Vlaams
tta0_baud	Sets the baud rate for the console terminal port. Possible settings are 600, 1200, 2400, 4800, 9600, or 19,200. This setting is volatile: if you cycle power on the system, the baud rate switch setting (behind the operator control panel) overrides the tta0_ baud setting.
tta1_baud	Sets the baud rate for the auxiliary serial port. Possible settings are 600, 1200, 2400, 4800, 9600, or 19,200. The default setting is 9600.

Variable	Description
tta0_halts	Sets the ability to halt the system from the console terminal keyboard by pressing Ctrl/P or Break. Possible settings are 0: Ctrl/P and Break are disabled; 2: Ctrl/P is enabled; 4: Break is enabled; 6 Ctrl/P and Break are enabled.
tta1_halts	Sets the ability to halt the system from the device that is connected to the auxiliary serial port by pressing Ctrl/P. Possible settings are 0: Ctrl/P is disabled; 2: Ctrl/P is enabled.

Examples

In the following example, the default device from which the system attempts to boot is set to eza0.

```
>>> set bootdef_dev eza0
```

In the next example, the system's default console action following error, halt, or power-up is set to boot.

```
>>> set auto_action boot
```

In the next example, the baud rate of the auxiliary serial port is set to 9600.

```
>>> set tta1_baud 9600
```

In the next example, the system default boot flags are set to 0,1.

```
>>> set boot_osflags 0,1
```

In the next example, the system default language is set to 32 (German).

```
>>> set language 32
```

In the next example, an environment variable called foo is created and given a value of 5.

```
>>> set foo 5
```

Reference

`clear`, `set host`, `show`, and Chapter 6.

set host

Synopsis

Connect the console program to the MSCP DUP server on a DSSI device.

set host -dup [-task *task_name*] *device*

Description

Connects the console program to another DUP server on a DSSI device. In the syntax, *device* is the name of the device to attach to the console program. Using the -dup option invokes the DSSI DUP server on the selected device. You can use the DUP protocol to examine and modify parameters of a DSSI device.

Parameters

Parameter	Description
device	Specifies the device to attach to the console program.

Flags

Flag	Description
-dup	Specifies connection to an MSCP DUP server. The DUP service may be used to examine and modify parameters of a DSSI device.
-task *task_name*	Specifies which DUP service utility to invoke. Refer to the example that follows for a list of utilities. If you do not specify this qualifier, a directory of utilities is displayed.

Examples

The following example shows how to connect to the MSCP DUP server on a device.

```
>>> show device du
      dud0.0.0.3.0               R2YQYA$DIA0                   RF72
>>> set host -dup dud0
      starting DIRECT on pud0.0.0.3.0 (R2YQYA)

      Copyright (C) 1990  Digital Equipment Corporation
      PRFMON V1.0  D  2-NOV-1990 10:30:58
      DKCOPY V1.0  D  2-NOV-1990 10:30:58
      DRVEXR V2.0  D  2-NOV-1990 10:30:58
      DRVTST V2.0  D  2-NOV-1990 10:30:58
      HISTRY V1.1  D  2-NOV-1990 10:30:58
      DIRECT V1.0  D  2-NOV-1990 10:30:58
      ERASE  V2.0  D  2-NOV-1990 10:30:58
      VERIFY V1.0  D  2-NOV-1990 10:30:58
      DKUTIL V1.0  D  2-NOV-1990 10:30:58
      PARAMS V2.0  D  2-NOV-1990 10:30:58
      Total of 10 programs.
      Task?
>>> set host -dup -task params dud0
      starting PARAMS on pud0.0.0.3.0 (R2YQYA)

      Copyright (C) 1990  Digital Equipment Corporation

      PARAMS> show allclass

      Parameter     Current           Default        Type     Radix
      --------- ----------------  ----------------  --------  -----
      ALLCLASS                 0                 0      Byte    Dec   B

      PARAMS>exit
      Exiting...
>>>
```

show

Synopsis

Display an environment variable value or other information.

show [*envar*] [{config,device,memory,pal,version}]

Description

Displays the current value (or setting) for an environment variable that you specify.

Alternatively, displays other information about the system, according to the parameters that you enter on the command line. For example, you can display the system configuration by entering `show config`.

Parameters

Parameter	Description
envar	Displays the value of the environment variable specified. Refer to the list of commonly used environment variables described in the next table.
config	Displays the current system configuration.
device	Displays devices and controllers in the system.
memory	Displays the memory module configuration.
pal	Displays the Privileged Architecture Library code (PALcode) version.
version	Displays the console program version.

Environment Variables

Variable	Description
auto_action	Displays the console action following an error, halt, or power-up: either halt, boot, or restart.
bootdef_dev	Displays the device or device list from which bootstrapping is attempted.
boot_osflags	Displays the additional parameters to be passed to system software.
language	Displays the language in which system software and layered products are displayed.
tta0_baud	Displays the baud rate for the console terminal port.
tta1_baud	Displays the baud rate for the auxiliary serial port.
tta0_halts	Displays the setting that indicates whether you can halt the system from the console terminal by pressing Ctrl/P or Break. Possible settings are: • 0: Ctrl/P and Break are disabled. • 2: Ctrl/P is enabled. • 4: Break is enabled. • 6: Ctrl/P and Break are enabled.
tta1_halts	Displays the setting that indicates whether you can halt the system from the device that is connected to the auxiliary serial port by pressing Ctrl/P. Possible settings are: • 0: Ctrl/P is disabled. • 2: Ctrl/P is enabled.

Examples

In the following example, the system displays the version of the console program that is installed on the system. The console program version is V3.0-1.

```
>>> show version
version                V3.0-1 Sep 20 1992 00:28:54
>>>
```

In the next example, the default system power-up action is displayed.

```
>>> show auto_action
auto_action      boot
>>>
```

In the next example, a system's default boot device is displayed. The default boot device in the example is eza0.

```
>>> show bootdef_dev
bootdef_dev      eza0.0.0.6.0
>>>
```

In the next example, the baud rate for the auxiliary serial port is displayed. The baud rate in the example is 1200.

```
>>> show tta1_baud
tta1_baud      1200
>>>
```

Reference

`set` and in Chapter 8: `show cluster`, `show config`, `show device`, `show pal`, `show memory`, `show version`

test

Synopsis

Tests the system.

test

Description

Performs a test on the entire system, excepting tape drives. When the tests are successfully completed, the message “tests done” is displayed. If any of the tests fail, a failure message is displayed.

All tests run concurrently for a minimum of 30 seconds. Tests complete when all component tests have completed at least one pass. Test passes are repeated for any component that completes its test before other components.

The run time of a test is proportional to the amount of memory to be tested and the number of disk drives to be tested. Running `test` on a system with fully configured 512-MB memory takes approximately 10 minutes to complete.

Examples

In the following example, the system, excepting tape drives, is tested, and the tests complete successfully.

```
>>> test
tape drives, if any, will not be tested
tests done
>>>
```

In the next example, the system, excepting tape drives, is tested, and the system reports an error message.

```
>>> test
tape drives, if any, will not be tested
retries to pkd0.2.0.3.0 exhausted
failed to send Read to dkd200.2.0.3.0

*** Hard Error - Error #5 -

Diagnostic Name        ID             Device  Pass  Test  Hard/Soft
29-JAN-1970
exer_kid         00000129       dkd200.2.0.3     0     0     1    0
1:14:05
Error in read of 0 bytes at location 0005D200 from device dkd200.2.0.3.0

*** End of Error ***

tests done
>>>
```

References

The following table describes where to find additional information about the console commands.

Task	Document
Enter comprehensive console commands	*DEC 4000 Model 600 Series Technical Manual*

6

Setting Environment Variables

Chapter Description

What Is an Environment Variable?

This chapter describes the DEC 4000 AXP Rackmount environment variables.

An environment variable is a firmware parameter that you can access from console mode. The DEC 4000 AXP Rackmount console program includes multiple environment variables. The setting of these firmware parameters affects the way the system powers up and boots operating system software.

In This Chapter

This chapter covers the following information:

- Overview: Do I Need to Set Environment Variables?
- Before You Begin
- Changing the Default Startup Action (auto_action)
- Setting or Changing the Default Boot Device (bootdef_dev)
- Setting Boot Flags (boot_osflags)
- Setting the Language (language)
- Changing the Baud Rate (tta0_baud and tta1_baud)
- Enabling Halt Key Functions (tta0_halts and tta1_halts)
- When You Have Finished Setting Variables

Overview: Do I Need to Set Environment Variables?

Deciding to Set Environment Variables

Although it is not essential to set environment variables, setting environment variables can simplify the operation of your system.

You set environment variables from console mode. The ideal time to set environment variables is before you boot operating system software. If your operating system is up and running, you must invoke console mode. (Refer to Invoke Console Mode in Chapter 3.)

After you have finished setting environment variables, you can begin or resume operating your system in operating system mode.

What Variables Can I Set?

Table 6–1 describes the environment variables and their factory settings.

Displaying Current Environment Variables

You can use the `show` command to display the current setting of any environment variable described in Table 6–1. For instance, to display the current setting of the auto_action environment variable, enter the following:

```
>>> show auto_action Return
```

The system responds with a display similar to the following:

```
auto_action     boot
```

In this example, the auto_action environment variable is set to boot.

Table 6–1 Environment Variables

Variable	Function	Factory Setting
auto_action	Specifies what action the console should take any time the system is powered up, crashes, or the Reset button is pressed.	Halt
bootdef_dev	Specifies the default boot device to the system.	System device on which Factory Installed Software (FIS) was loaded.
boot_osflags	Sets the boot flags and in OpenVMS AXP, a root number.	Null
language	Sets the console keyboard layout to a supported language.	Language used where your system was built.
tta0_baud	Specifies the baud rate for the console terminal port. (This setting is volatile.)	9600
tta1_baud	Specifies the baud rate for the auxiliary serial port.	9600
tta0_halts	Specifies whether Ctrl/P and Break are enabled on the console terminal keyboard.	4 (Break is enabled.)
tta1_halts	Specifies whether Ctrl/P and Break are enabled on the device connected to the auxiliary serial port.	0 (Ctrl/P and Break are disabled.)

Before You Begin

Preliminary Actions

Before changing any environment variables, you should have done the following:

- Placed your system at the console prompt.

  If your system is not displaying the >>> prompt, refer to Invoke Console Mode in Chapter 3.
- Determined which variables, if any, you wish to set.

  Each of the following sections in this chapter describes a particular environment variable. For information about why you might want to set a variable, refer to the section that describes that variable.
- Read a summary of the `set` command and the environment variables in set in Chapter 5.
- Read Chapter 4 and the rest of this chapter.

Changing the Default Startup Action (auto_action)

Default Startup Actions

The setting of the auto_action environment variable determines how your system reacts when you power up the system, or press the Reset button, or when the system crashes. There are three possible settings:

- halt
- boot
- restart

The default setting is halt.

Your System's Current Startup Action

To display your system's current default startup action, enter the following:

```
>>> show auto_action Return
```

The system responds with a display similar to the following:

```
auto_action     boot
```

In this example, the default startup action is boot.

Choosing "Halt"

Setting the default startup action to halt causes your system to remain in console mode when you power up the system, when the system crashes, or when you press the Reset button.

Choosing "Boot"

If you plan to boot your system from the same device, you may want to set your system's default startup action to boot.

The bootdef_dev environment variable works in conjunction with this setting: whenever you power up your system or press the Reset button, or the system crashes, your system boots automatically from the boot device identified by the bootdef_dev environment variable. The system is said to "autoboot."

Autobooting:

- Causes the operating system to automatically restart in the event of a power interrupt.
- Simplifies the boot process for a less experienced user trying to boot operating system software.
- Decreases the user response required to get to the operating system level.

Choosing "Restart"

Setting the default startup action to restart causes your system to attempt to restart the operating system automatically if the system crashes. If the restart attempt is unsuccessful, the system reboots the operating system.

When you power up the system or press the Reset button, the system automatically boots the operating system (autoboot). Refer to Choosing Boot for more information about autobooting.

Set the Default Startup Action

To set the default startup action, complete the following steps:

Step	Action
1	Are you choosing the boot or the restart startup action? • No. Proceed to the next step. • Yes. Identify the boot device to the system if it is not already identified. Refer to the next section, Setting or Changing the Default Boot Device (bootdef_dev) .
2	Set the default startup action by entering the following command: `>>> set auto_action` *`action`* For example, to set the startup action to boot, enter the following: `>>> set auto_action boot`
3	Set another environment variable or reboot the system.

Undo the Setting

Clear the auto_action environment variable or set your system to manual boot by entering the following command:

```
>>> set auto_action halt
```

Setting or Changing the Default Boot Device (bootdef_dev)

Default Boot Device

The boot device is the device from which the bootstrap system software is acquired. In most cases, the default boot device has been identified on your system as the device on which Factory Installed Software (FIS) was loaded.

Why Set the Default Boot Device?

By identifying the boot device to your system, you can simplify the process of booting operating system software as follows:

- You can enter `b` and press Return at the console prompt and the system will find and boot operating system software.
- You can automatically boot operating system software by setting the default startup action to boot (using the auto_action environment variable) in conjunction with this variable.

Your System's Current Default Boot Device

To display your system's current default boot device, enter the following:

```
>>> show bootdef_dev Return
```

The system responds with a display similar to the following:

```
bootdef_dev       dka0
```

In this example, the default boot device is dka0.

Which One Is the Boot Device?

If a default boot device has not been set and you do not know which device is the boot device, determine your system's boot device as follows:

- Display the devices connected to your system:

  ```
  >>> show device
  ...
  ```

- Beginning at the top of the list of devices that are displayed and working downward, try booting operating system software from each device.

For instance, to try booting software from SCSI devices:

```
>>> boot dka0
boot dka0.1.0.2.0 -flags 0
block 0 of dka0.1.0.2.0 is not a valid boot block
bootstrap failure
>>>
>>>boot dka1
boot dka1.1.0.2.0 -flags 0

booting system software...
```

To try booting software from DSSI devices:

```
>>> boot dua0
boot dua0.1.0.2.0 -flags 0
block 0 of dua0.1.0.2.0 is not a valid boot block
bootstrap failure
>>>
>>>boot dua1
boot dua1.1.0.2.0 -flags 0

booting system software...
```

The system begins booting when you have found the boot device.

Preliminary Considerations

Before identifying the boot device, consider the following:

- Your boot device may already be set. (See previous section.)
- You can identify multiple boot devices to the system. By doing so, when you enter `b` or `boot` at the console prompt, the system searches for a bootable device from the list of devices that you specify. The system then automatically boots from the first device on which it finds software.
- You can override the default boot device by specifying an alternative device name on the `boot` command line.

Note

When you identify multiple devices, the system attempts to boot operating system software from each device in the order that you list the devices. Always list network devices last.

Set or Change the Default Boot Device

Set or change the default boot device as follows:

Step	Action
1	Determine the device or devices that you wish to set as the default. If a default boot device has not been set and you do not know your system's boot device, see the previous section Which One Is the Boot Device?
2	Set the environment variable by entering the following command, substituting for *device_name* the name (or names) of your boot devices: `set bootdef_dev device_name` For example:
3	Set another environment variable or reboot the system.

If the boot device is . . .	Enter . . .
The SCSI drive, DKA0	`>>> set bootdef_dev DKA0`
The DSSI drive, DUB0	`>>> set bootdef_dev DUB0`
Multiple devices, DUB0 and DKA0	`>>> set bootdef_dev DUB0,DKA0`

Undo the Setting

Clear the bootdef_dev environment variable by entering the following command:

```
>>> set bootdef_dev ""
```

Setting Boot Flags (boot_osflags)

What Are Boot Flags?

Boot flags contain information that is read and used by the operating system during a system bootstrap procedure.

Boot flags may be passed to the operating system either on the `boot` command line with the -flags option (see boot in Chapter 5) or by setting the boot_osflags environment variable as described in this section. The default boot flag setting is null.

The interpretation of the boot flags is operating system dependent.

Boot Flags Settings for OpenVMS AXP Systems

The OpenVMS AXP operating system takes two boot flag arguments:

- root number
- boot flags

If the boot_osflags environment variable is given or has been set to only one argument, the argument designates the boot flag and not the root number.

Root Number Settings

The root number is the directory number on the system disk on which OpenVMS AXP files are located.

For instance:

If OpenVMS AXP files are located on . . .	The root number for the system is . . .
[SYS0.SYSEXE]	0 (default)
[SYS1.SYSEXE]	1
[SYS2.SYSEXE]	2
[SYS3.SYSEXE]	3

If your files are located on the default disk [SYS0.SYSEXE], you do not need to specify the root number.

Boot Flag Settings

Possible boot flags settings and their meanings for OpenVMS AXP systems are:

Flag Setting	Bit Number	Meaning
1	0	Bootstrap conversationally (enables you to modify SYSGEN parameters in SYSBOOT).
2	1	Map XDELTA to running system.
4	2	Stop at initial system breakpoint.
8	3	Perform diagnostic bootstrap.
10	4	Stop at the bootstrap breakpoints.
20	5	Omit header from secondary bootstrap image.
80	7	Prompt for the name of the secondary bootstrap file.
100	8	Halt before secondary bootstrap.
10000	16	Display debug messages during booting.
20000	17	Display user messages during booting.

For more information about boot flags, refer to *OpenVMS Alpha Version 1.0 Upgrade and Installation Manual*.

Boot Flags Settings for DEC OSF/1 AXP Systems

The DEC OSF/1 AXP operating system takes only one boot flag argument: the boot flag.

Possible boot flag settings and their meanings for DEC OSF/1 AXP systems are:

Flag Setting	Meaning
a	Load operating system software from the specified boot device (autoboot). Boot to multiuser mode.
i	Prompt for the name of a file to load and other options (boot interactively). Boot to single user mode.

Your System's Current Default Boot Flags

To display your system's current default boot flags, enter the following:

```
>>> show boot_osflags Return
```

The system responds with a display similar to the following:

```
boot_osflags    1,8
```

In this example, the default root setting is 1 and the boot flag setting is 8.

If the boot_osflags environment variable is given or has been set to only one argument, the argument designates the boot flag and not the root number.

When to Set Boot Flags

Under normal circumstances, the default boot flag settings will suit your environment.

If you wish to change your system's boot process, using the possible flag settings and their meanings, set your system boot flags according to how you want the default boot process to work.

Set Boot Flags

Set boot flags as follows:

Step	Action

1	Set the environment variable by entering the following command, substituting for *root_number* and *bootflag* the values to which you wish to set the root number and boot flags.
	`>>> set boot_osflags root_number,bootflag`
	For instance, in OpenVMS AXP, to set the root number to 1 and the boot flags to 2, enter the following:
	`>>> set boot_osflags 1,2`
	In OpenVMS AXP, to set the boot flags to 1 and to leave the root number as the default, enter the following:
	`>>> set boot_osflags 1`
	In DEC OSF/1 AXP, to set the boot flags to autoboot, enter the following:
	`>>> set boot_osflags a`

2	Set another environment variable or reboot the system.

Setting the Language (language)

Do I Need to Set the Language?

The DEC 4000 AXP Rackmount system ships from the factory with a default language setting that determines the language that the system will display on the console terminal.

If the default language differs from the language you want the system to display, you can change the language setting.

Possible Settings

Possible language settings and their codes are as follows:

0 none (cryptic)
30 Dansk
32 Deutsch
34 Deutsch (Schweiz)
36 English (American)
38 English (British/Irish)
3A Espanol
3C Francais
3E Francais (Canadian)
40 Francais (Suisse Romande)
42 Italiano
44 Nederlands
46 Norsk
48 Portugues
4A Suomi
4C Svenska
4E Vlaams

Your System's Current Language

To display your system's current language, enter the following:

```
>>> show language Return
```

The system responds with a display similar to the following:

```
language        36
```

In this example, the language is set to 36: the system displays text written in American English.

Change the Language

To set the language that the system displays on output devices, do the following:

Step	Action
1	Determine the code number for the language you want system output devices to display.

2	Enter the following:
	`>>> set language language_code`
	For example:
	`>>> set language 3A`
	This commands sets the display to Spanish.

Changing the Baud Rate (tta0_baud and tta1_baud)

Which Baud Rates Can I Change?

Two environment variables allow you to change the baud rate of the console terminal port and the auxiliary serial port from the console terminal:

- tta0_baud allows you to set the baud rate for the console terminal port.
- tta1_baud allows you to set the baud rate for the auxiliary serial port.

The setting of tta0_baud is volatile, that is, if you cycle power on the system, the value of tta0_baud is overridden by the setting of the baud rate switch that is located behind the system’s operator control panel. Refer to Changing the Baud Rate in Chapter 10 for information about setting the console terminal port baud rate more permanently.

Displaying the Current Baud Rates

The default setting for both tta0_baud and tta1_baud is 9600.

Displaying the Console Terminal Port Baud Rate

To display your console terminal port's baud rate, enter the following:

```
>>> show tta0_baud Return
```

The system responds with a display similar to the following:

```
tta0_baud     9600
```

In this example, the system's console terminal port baud rate is 9600.

Displaying the Auxiliary Serial Port Baud Rate

To display your auxiliary serial port baud rate, enter the following:

```
>>> show tta1_baud Return
```

The system responds with a display similar to the following:

```
tta1_baud     9600
```

In this example, the system's auxiliary serial port baud rate is 9600.

Change the Baud Rate

Change a baud rate as follows:

Step	Action
1	Determine the baud rate to which you must set the console terminal or auxiliary serial port. The possible settings are: 600 1200 2400 4800 9600 19,200

2	Set the baud rate by entering the following command, substituting for *port_envar* the environment variable for the port you wish to set, and for *baud_rate* the baud rate to which you wish to set the port.
	`>>> set port_envar baud_rate`
	For instance, to set the console terminal port to 1200 baud, enter the following:
	`>>> set tta0_baud 1200`
	To set the auxiliary serial port to 1200 baud, enter the following:
	`>>> set tta1_baud 1200`

3	Set another environment variable or reboot the system.

Enabling Halt Key Functions (tta0_halts and tta1_halts)

Why Enable Halt Key Functions?

To invoke console mode (halt the system), you must press the Halt button on the system. Alternatively, you can invoke console mode from a terminal keyboard. You enable this ability by setting an environment variable:

- tta0_halts allows you to invoke console mode from the console terminal keyboard by pressing Ctrl/P or Break.
- tta1_halts allows you to invoke console mode from the keyboard of a device connected to the auxiliary serial port by pressing Ctrl/P.

Possible Settings

Possible settings for each environment variable are as follows:

tta0_halts Setting	tta1_halts Setting	Description
0	0 (default)	Ctrl/P and Break are disabled.
2	2	Ctrl/P is enabled.
4 (default)	–	Break is enabled.
6	–	Both Ctrl/P and Break are enabled.

Your System's Current Halt Key Settings

Display the current halt key settings for the two different ports as follows.

Displaying Your Console Terminal's Halt Key Settings

To display your console terminal keyboard's current halt key settings, enter the following:

```
>>> show tta0_halts Return
tta0_halts     4
```

In this example, tta0_halts is set to 4: Break is enabled.

Displaying Your Auxiliary Serial Device's Halt Key Settings

To display current halt key settings for the device connected to the auxiliary serial port, enter the following:

```
>>> show tta1_halts [Return]
tta1_halts      0
```

In this example, tta1_halts is set to 0: Ctrl/P and [Break] are disabled.

Set or Change the Halt Key Functions

Set the tta0_halts and tta1_halts environment variables to suit your system environment. For example, to enable Ctrl/P and [Break] on the console terminal keyboard, enter the following:

```
>>> set tta0_halts 6
```

To enable Ctrl/P on the remote console device, enter the following:

```
>>> set tta1_halts 2
```

When You Have Finished Setting Variables

Reboot the System

When you have finished setting environment variables, return to normal operation by rebooting your system:

Step	Action
1	Did you invoke console mode by pressing the Halt button on the control panel? • Yes. Press the Halt button on the control panel to the out position. • No. Proceed to the next step.
2	Boot the system using the `boot` command.

7

Operating Mass Storage Devices

Chapter Description

Overview

Mass storage devices are drives that are used to store large amounts of data for extended periods. The DEC 4000 AXP Rackmount system uses both DSSI and SCSI mass storage devices to store data.

In This Chapter

This chapter covers the following information:

- DEC 4000 AXP Rackmount Mass Storage Devices and Compartments
- Operating DEC 4000 AXP Rackmount Mass Storage Devices

  The devices described are: RZ-series drives, the RRD42, the TLZ06, and the TZ30.
- Maintaining Mass Storage Media and Devices

For Additional Information

This chapter does not describe how to read data to or copy data from a drive. Consult your system software documentation for this type of information.

DEC 4000 AXP Rackmount Mass Storage Devices and Compartments

Locating Mass Storage Devices

Warning

The bottom tray is available for service access only. This area is for use by Digital customer service personnel and qualified self-maintenance customers only.

Mass storage devices are located in the bottom tray inside your system as shown in Figure 7–1. Two mounts are reserved for fixed-media drives (❸–❹); these drives are RZ-series only.

Two mounts are reserved for removable-media devices (❶–❷); these devices include the RRD42, the TLZ06, and the TZ30.

Local Disk Converter (LDC)

A local disk converter (LDC) ❺ that is located in the bottom tray powers the internal mass storage devices.

Note

Indicators and lights on any storage media installed in the center mounting positions of the bottom tray are not visible without lowering the tray.

The DEC 4000 AXP Rackmount only supports one (1) Local Disk Converter (LDC). Therefore, should this LDC fail, the Disk Power Failure Indicator on the Power System Controller (PSC) will light and a "3" is displayed in the hexadecimal Fault ID display. Any other error code displayed in the Fault ID display in conjunction with a Disk Power Failure indication, is not applicable to the DEC 4000 AXP Rackmount. For more information on interpreting LDC error codes, refer to Figure 11–1 and Table 11–5.

Operating DEC 4000 AXP Rackmount Mass Storage Devices

Before You Operate Mass Storage Devices

Before operating mass storage devices:

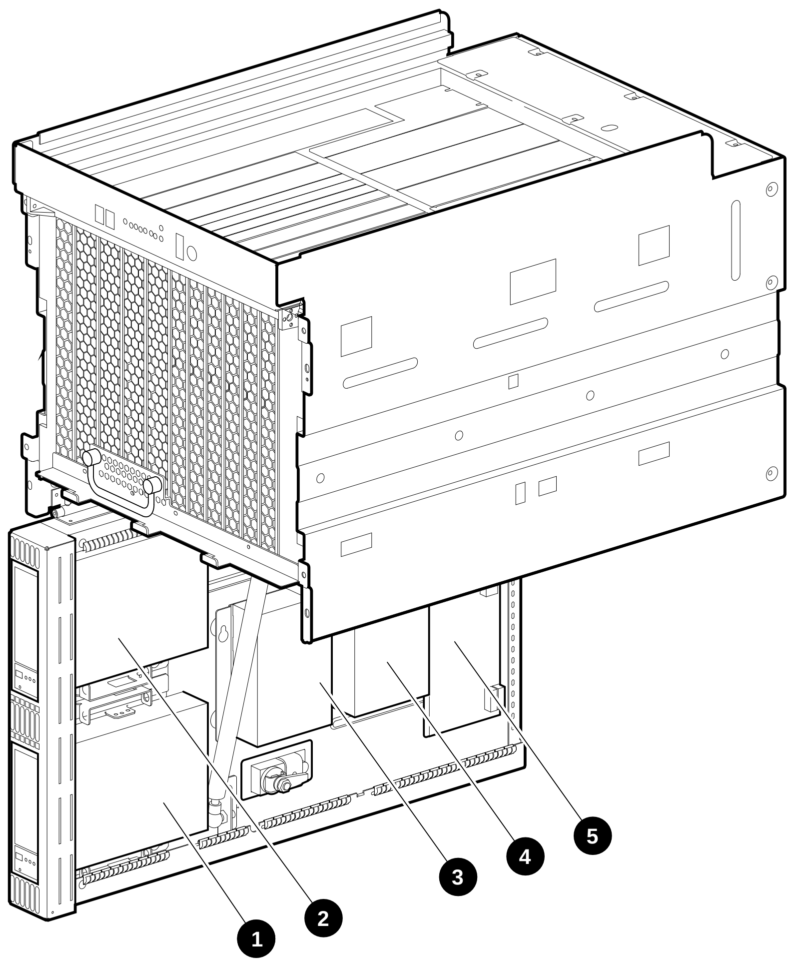
- Mount the device.

  Typically, you must mount a device before you can begin using it. You mount a device while the system is in operating system mode. Refer to your operating system documentation for information about how to mount a device.

- Familiarize yourself with the care and maintenance required by the device.

  These tasks are described in Maintaining Mass Storage Media and Devices later in this chapter.

Figure 7–1 Bottom Tray



Operating DEC 4000 AXP Rackmount Devices

The remaining sections of this chapter describe how to operate each DEC 4000 AXP Rackmount mass storage device. Table 7–1 describes the half height devices that are available for use in the bottom tray of the DEC 4000 AXP Rackmount system.

NOTE

The DEC 4000 AXP Rackmount system supports only half height storage devices internally.

Table 7–2 describes the devices that may be mounted and supported externally to the DEC 4000 AXP Rackmount system.

Table 7–1 Devices Supported Internally to the DEC 4000 AXP Rackmount

Storage Option	Capacity	Form Factor	Seek Time	Transfer Rate	Interface
RRD42	600 MB	5 1/4 in	300 ms	150 KB/s	SCSI
RZ26	1.0 GB	3 1/2 in	9.5 ms	3.3 MB/s	SCSI/Fast SCSI
RZ27	1.6 GB	3 1/2 in	9.5 ms	44 MB/s	SCSI/Fast SCSI
TLZ06	4.0 GB	5 1/4 in	—	366 KB/s	SCSI
TZ30	95 MB	5 1/4 in	—	62.5 KB/s	SCSI

Table 7–2 Devices Supported Externally to the DEC 4000 AXP Rackmount

Storage Option	Capacity	Form Factor	Seek Time	Transfer Rate	Interface
RF35	852 MB	3 1/2 in	9.5 ms	4.0 MB/s	DSSI
RF73	2.0 GB	5 1/4 in	12.9 ms	2.2 MB/s	DSSI
RZ73	2.0 GB	5 1/4 in	12 ms	2.2 MB/s	SCSI
TSZ07	160 MB	—	—	4.0 MB/s	SCSI
TZ85	2.6 GB	5 1/4 in	—	800 KB/s	SCSI
TZ857	18.2 GB	—	—	800 KB/s	SCSI

Operating RZ- and RF-Series Disk Drives

RZ- and RF-Series Description

RZ- and RF-series drives are fixed-media disk drives that store up to 3.2 gigabytes of information on a disk that remains fixed inside the drive. RZ-series drives are SCSI compatible; RF-series drives are DSSI compatible.

Four SCSI-compatible mass storage devices can be mounted internally in your system. Other SCSI or DSSI devices can be mounted externally. (See Figure 7–1.)

External Fast SCSI

Depending on the configuration you ordered, your system can support fast SCSI speed on external RZ-series drives. Fast SCSI speed is an optional mode of SCSI-2 that allows data transmission rates of up to 10 MB/s. Actual transmission rate is dependent on cable length and the amount of devices on the bus.

For further information on fast SCSI devices contact your Digital Sales Representative.

RZ-Series Fault Light

Each RZ-series disk drive has a fault light. If the fault light comes on blinking amber the drive is executing self-tests. If the fault light comes on solid amber, the drive has failed.

Note

Indicators and lights on any storage media installed in the center mounting positions of the bottom tray are not visible without lowering the tray.

Write-Protecting an RF-Series and RZ-Series Disk

The RF-Series and RZ-series drives have no Write-Protect button. You set write-protection through console commands in console mode.

Software Write-Protect for RF- and RZ-Series Drives

To software write-protect an RF-series drive or an RZ-series drive on the OpenVMS AXP operating system, enter the following DCL command:

```
$ MOUNT device_name volume_label/SYSTEM/NOWRITE
```

The *device_name* is the device name shown using the OpenVMS AXP DCL command `SHOW DEVICE DI`. The *volume_label* is the volume label for the device. For example, the following command will software write-protect device 1DIA1:

```
$ MOUNT $1$DIA1 OMEGA/SYSTEM/NOWRITE
```

To write-enable the device, dismount the device, and then remount it (without using the /NOWRITE qualifier). For example:

```
$ DISMOUNT $1$DIA1 OMEGA/SYSTEM
$ MOUNT $1$DIA1 OMEGA/SYSTEM
```

To check the protection status of the drive on the OpenVMS AXP operating system, enter `SHOW DEVICE DI`. A write-protected drive will show a device status of “`Mounted wrtlck`”. Refer to your OpenVMS AXP documentation for more information on using the MOUNT utility.

Caution

When you dismount the device, then mount it again, it will no longer be write-protected, unless you use the /NOWRITE qualifier.

Console Mode Write-Protect For RF-Series and RZ-Series Drives

Note

RF-series drives can only be incorporated into the DEC 4000 AXP Rackmount system via the external media expansion ports (A, B, C, or D). See Chapter 8 for information on using external media expansion ports.

The console mode write-protect provides a more permanent write-protection than the software write-protect. Once you write-protect an RF-series drive from console mode, it remains write-protected, regardless of the availability of the operating system or if the system is powered down. You cannot remove a console mode write-protection using the `mount` command.

Consider write-protecting an RF-series drive from console mode in the following situations:

- To write-protect an RF-series drive when the OpenVMS AXP operating system is not available
- To ensure that an RF-series drive remains write-protected under all circumstances

To write-protect an RF-series drive through console commands entered at the console prompt (>>>), use the following instructions:

1. Access the Diagnostic and Utility Program (DUP) driver for the device you want to write-protect.

   To access the DUP driver from console mode:

   a. Invoke console mode by pressing the Halt button or powering up the system with the Halt button pressed to the in position.

Caution

Halting your system without following the shutdown procedure described in your system software manuals can result in loss of data.

---

b. Access the DUP driver by setting host to the specific device you want to write protect.

   Use the following command:

```
>>> set host -dup device_name -task params
```

   The *device_name* is the complete device name (console device name or OpenVMS AXP device name) as shown using the `show device du` command.

2. At the `PARAMS>` prompt, enter `SET WRT_PROT 1` to write-protect the RF-series drive to which you are currently connected.

   Note

   To verify that you have set host to the intended drive, enter the `locate` command at the `PARAMS>` prompt. The `locate` command causes the drive's fault light to blink momentarily.

3. At the `PARAMS>` prompt, enter `SHOW WRT_PROT` to verify that the WRT_PROT parameter is set to 1.
4. After you have completed setting and examining the WRT_PROT device parameter, enter the `write` command at the `PARAMS>` prompt to save the device parameter. The change is recorded to nonvolatile memory.
5. Enter the EXIT command at the `PARAMS>` prompt to exit the DUP driver utility for the specified device.

Example 7–1 provides an example of setting a write-protect through console commands in console mode.

Example 7–1 Setting Hardware Write-Protection Through Firmware

```
>>> set host -dup dua0.0.0.0.0 -task params

Starting DUP server...
Copyright (c) 1992  Digital Equipment Corporation
PARAMS> SET WRT_PROT 1
PARAMS> WRITE
PARAMS> SHOW WRT_PROT

Parameter     Current           Default        Type     Radix
--------- ----------------  ----------------  --------  -----
WRT_PROT                 1                 0   Boolean    0/1
PARAMS> EXIT
Exiting...
Stopping DUP server...
>>>
```

To remove the console mode write-protection, repeat the above procedure, but set the WRT_PROT value to 0.

You can verify that the device is write-protected while running OpenVMS AXP. Enter the DCL command `show device di`. A write-protected drive will show a device status of "`Mounted wrtlck`". If you enter the OpenVMS AXP command `show device/full`, a write-protected drive will be listed as "`software write-locked`".

Note

You cannot remove console mode write-protection using the OpenVMS AXP MOUNT utility.

Operating the RRD42 Compact Disc Drive

RRD42 Description

The RRD42 compact disc drive reads information from removable, read-only compact discs that hold up to 600 megabytes per compact disc. Figure 7–2 shows the components of the RRD42.

❶ Headphone port

❷ Headphone volume control

❸ Disc caddy slot

❹ ID dimple

❺ Busy light

❻ Eject button

❼ Manual eject hole

❽ Compact disc caddy

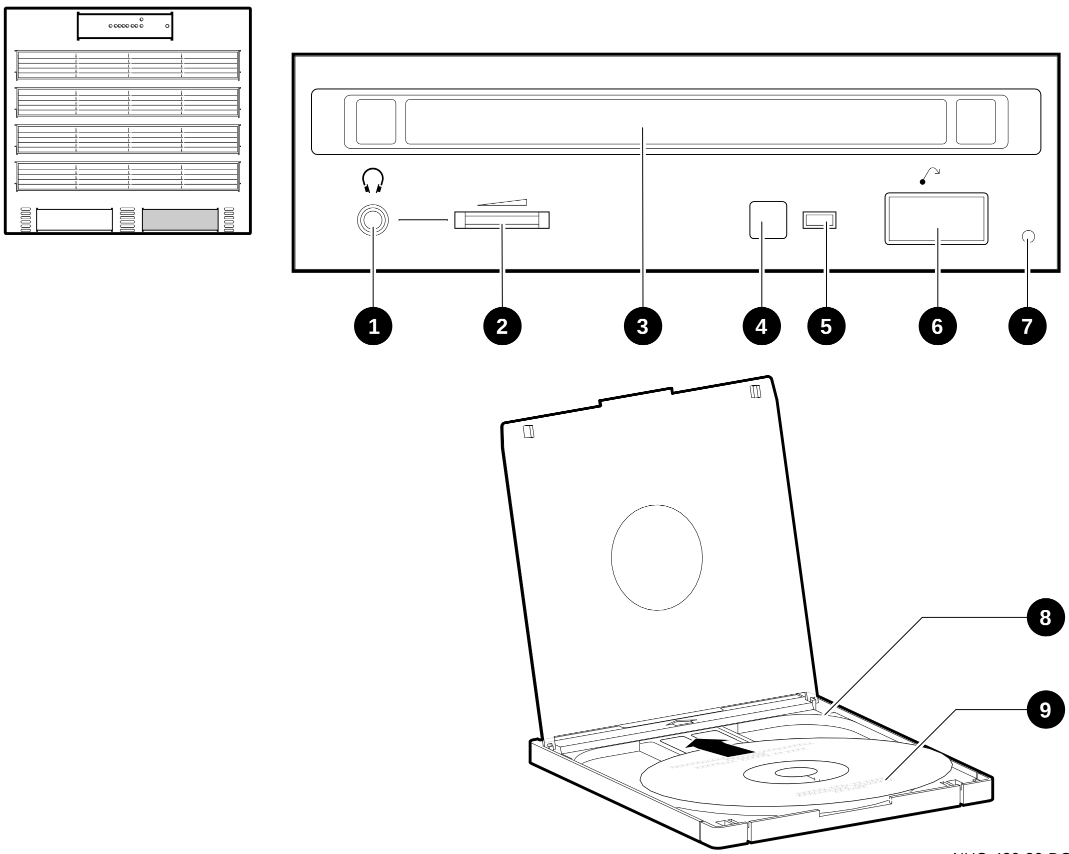
❾ Compact disc

Up to two RRD42 drives can be located in the bottom tray.

Caution

Handle a compact disc by its edges. Do not touch the surface of a disc. Fingerprints and dust can cause the disc to malfunction.

Figure 7–2 RRD42 Compact Disc Drive and Compact Disc



Inserting a Compact Disc

To insert a compact disc into the RRD42 (Figure 7–3):

1. Gather both the compact disc caddy and the disc you wish to insert.
2. If there is a protective film on the center of the caddy lid, remove the film ❶.
3. Open the caddy by pressing the tabs on both sides of the caddy at the end opposite the shutter ❷.
4. Set the disc, printed side up, into the caddy as shown ❸.
5. Press firmly on both corners to close the caddy lid.
6. Insert the disc caddy into the drive ❹. Push the caddy gently into the drive as far as it will go. The caddy should be completely inside the drive when properly inserted.

   The busy light comes on when the caddy has been inserted correctly.
7. When the busy light goes off, the compact disc drive is ready to use. To operate the compact disc drive, follow the instructions provided with your system software.

Removing a Compact Disc

To remove a compact disc (Figure 7–3):

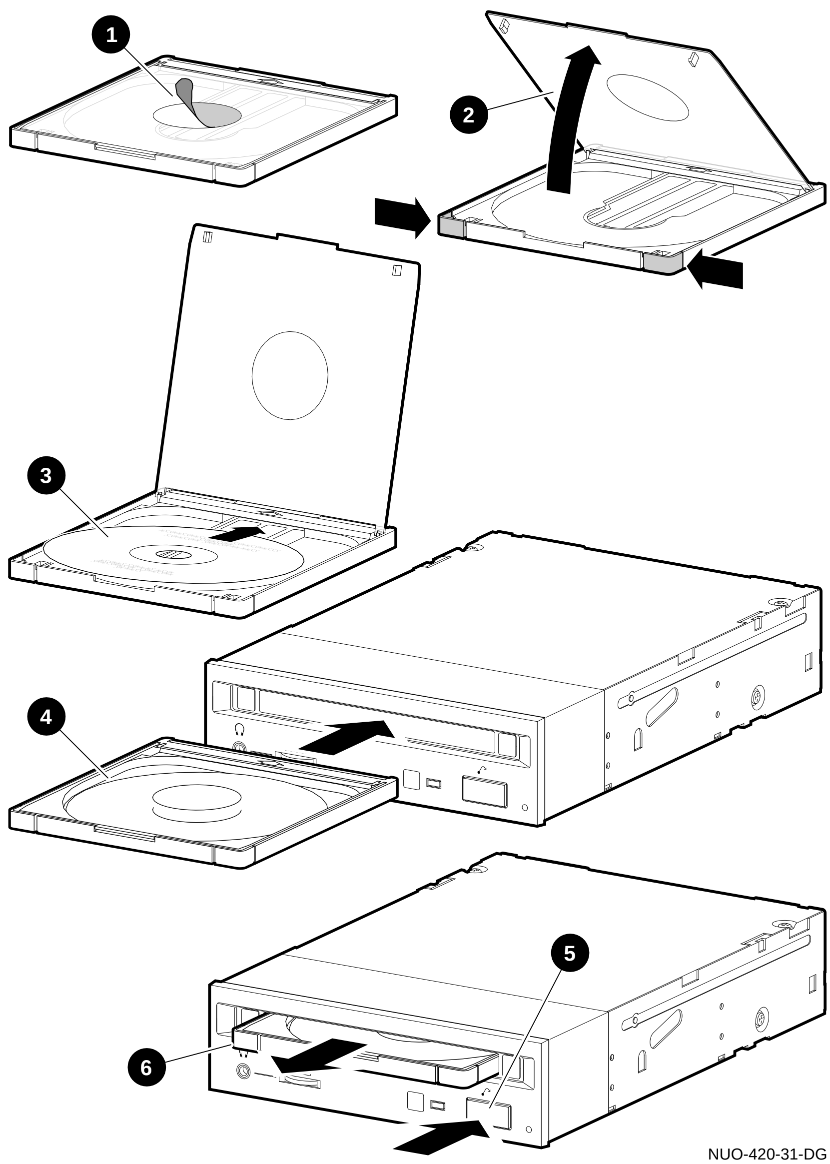
1. Press the eject button ❺.

   The caddy will automatically eject part way.
2. Remove the caddy from the drive ❻.

RRD42 Light

The RRD42 busy light comes on when the system is reading data from the compact disc.

Figure 7–3 Inserting and Removing a Compact Disc



Operating the TLZ06 Tape Drive

TLZ06 Description

The TLZ06 tape drive stores information on removable tape cartridges that can hold up to 4 gigabytes per tape cartridge. Figure 7–4 shows the components of the TLZ06.

❶ Tape/activity light

❷ Write-protect light

❸ Tape cassette slot

❹ Tape unload button

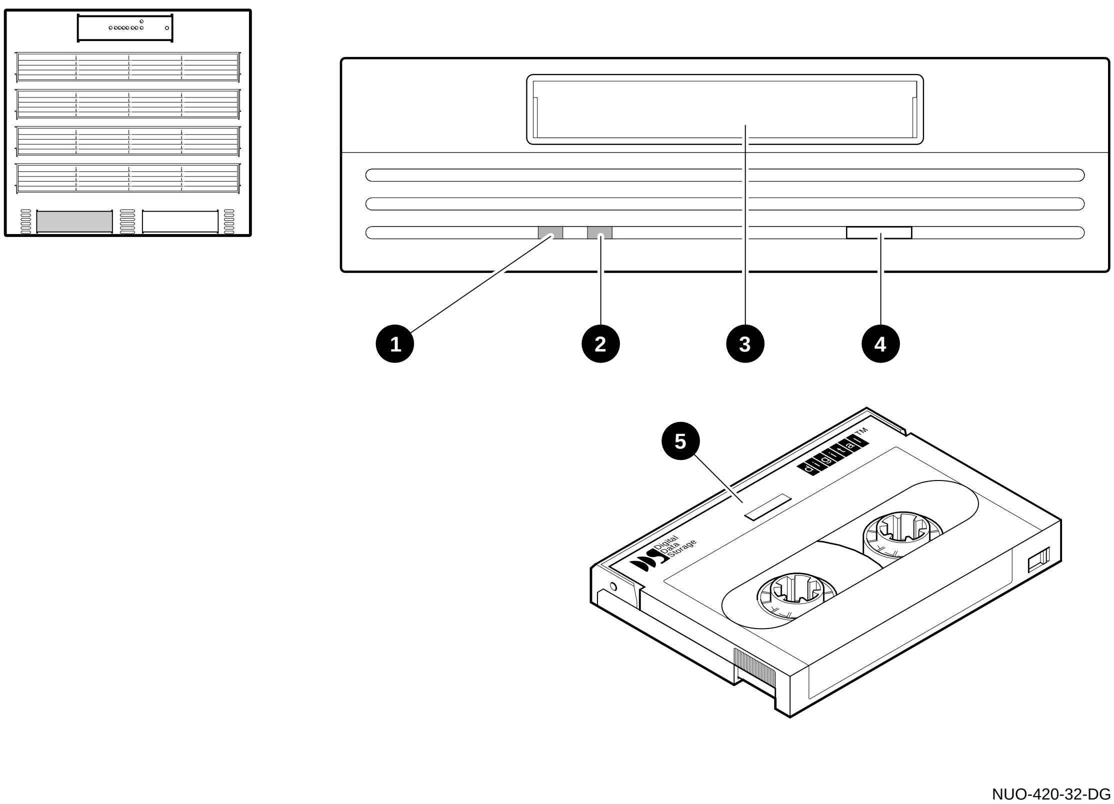
❺ DDS tape

Up to two TLZ06 drives (one if an RRD42 drive is present) can be located in the bottom tray.

Compatible Tapes

Digital recommends that you use DDS certified tapes.

Figure 7–4 TLZ06 Drive and Compatible Tape



Inserting a Tape into the TLZ06

To insert the DDS tape into the TLZ06 (Figure 7–5):

1. Check to see that the tape/activity light on the drive is unlit. If it is lit, there is already a tape in the drive. Remove the tape from the drive before continuing. (See Removing a Tape from the TLZ06, below.)
2. Set the write-protect switch on the DDS tape that you wish to insert to either the write-protected ❶ or write-enabled ❷ position.
3. Insert the DDS tape into the drive, with the tape oriented as shown in ❸.

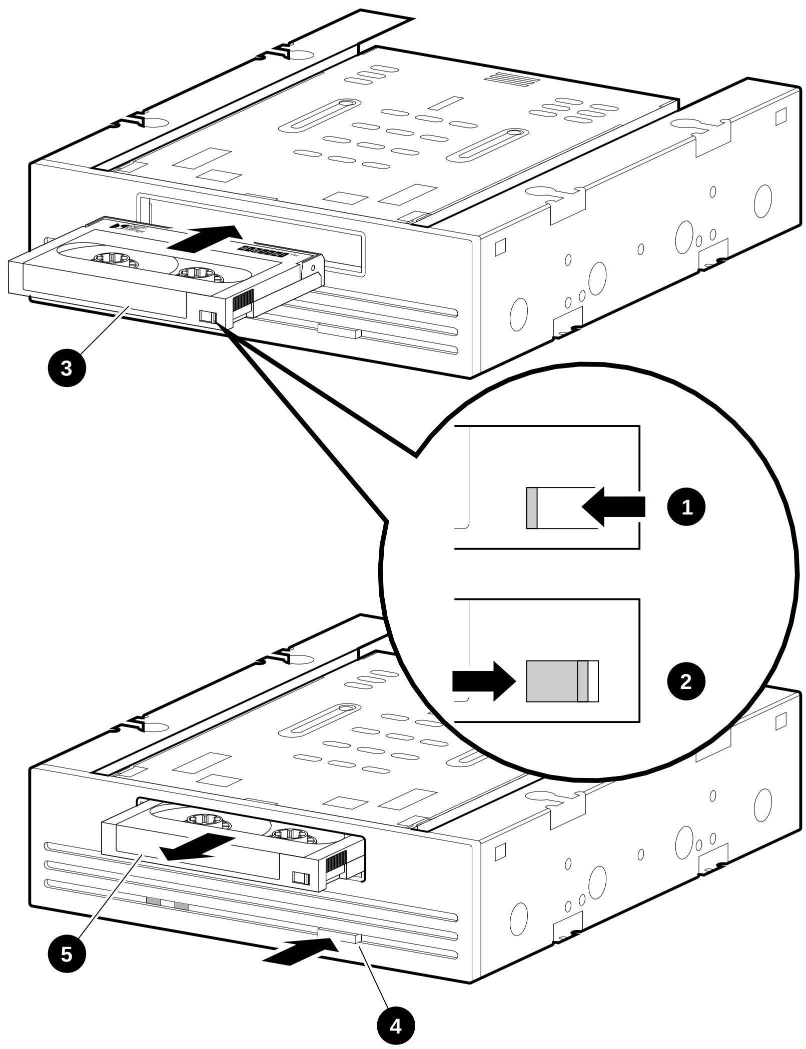
Removing a Tape from the TLZ06

To remove a DDS tape from the TLZ06 (Figure 7–5):

1. Check to see that the tape/activity light is on solid green. If the tape/activity light is flashing, the drive has not finished completing a data transfer. Wait until the tape/activity light comes on solid green before proceeding.
2. Press the unload button to eject the tape ❹.

   The tape ejects part way.
3. Remove the tape from the drive ❺.

Figure 7–5 Inserting and Removing a Tape: TLZ06



TLZ06 Lights

Table 7–3 summarizes the conditions indicated by the TLZ06 lights.

Table 7–3 TLZ06 Light Summary

Write-Protect Light	Tape/Activity Light	Condition
Off	Off	No tape loaded
Off	Green	Tape loaded and write-enabled
Off	Blinking green	Busy
Amber	Green	Tape loaded and write-protected. No SCSI drive activity
Amber	Blinking green	SCSI drive activity
Off to amber	Blinking green. Goes to solid green when done. Indicates drive activity.	Load sequence
Amber goes off	Blinking green. Goes to off when done. Indicates drive activity.	Unload sequence
Amber 1–2 seconds, then off	Green for 1–2 seconds. Green blinking for remainder of power-on self-test (POST). When POST successfully completed, normal indications.[1]	Power-on/ reset sequence
Amber	Blinking green until test completes (1–4 minutes). When test successfully completed, normal indications.[1]	POST:Self-test:lvl 1 (basic self-test) and Lvl 2 (extended self-test)

[1]Normal indications: Both lights off when tape is not inserted. Both lights on when tape is inserted and write-protected. Amber off and green on when tape is loaded and write-enabled.

(continued on next page)

Table 7–3 (Cont.) TLZ06 Light Summary

Write-Protect Light	Tape/Activity Light	Condition
Blinking amber	Blinking green. Test failure.	Drive fault.

Operating the TZ30 Tape Drive

TZ30 Description

The TZ30 cartridge tape drive stores information on removable tape cartridges that can hold up to 95 megabytes per tape cartridge. Figure 7–6 shows the components of the TZ30.

Up to two TZ30 drives (one if an RRD42 drive is present) can be located in the removable-media mass storage compartment.

Compatible Tapes

The TZ30 *can use* CompacTape and CompacTape II cartridges that:

- Have not been written to.
- Have been written to by a TZ30 or a TK50 tape drive.

The TZ30 tape drive *cannot use*:

- A CompacTape III cartridge.
- Any tape that has been written to by a TK70 tape drive.

❶ Write Protect light (orange)

❷ Tape in Use light (yellow)

❸ Operate Lever light (green)

❹ Unload button

❺ Drive lever

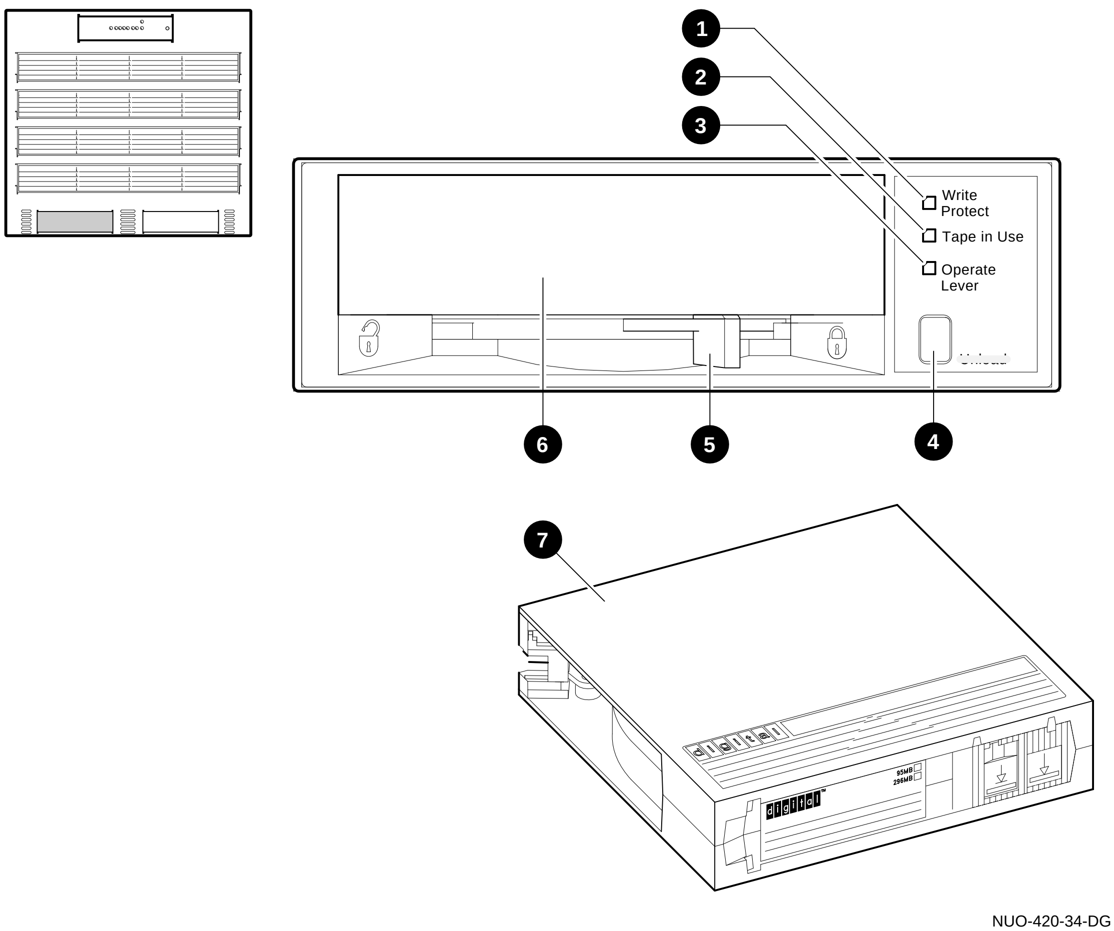
❻ CompacTape slot

❼ CompacTape cartridge

Caution

Do not push a tape cartridge into the TZ30 while moving the cartridge lever between the lock and unlock positions. Doing so can damage the drive.

Figure 7–6 TZ30 Tape Drive and Compatible Tape



Inserting a Tape into the TZ30

To insert the TZ30 tape into the drive (Figure 7–7):

1. If the cartridge lever on the drive is in the lock position, move the lever to the unlock position ❶.
2. Set the Write Protect switch on the tape cartridge to either the write-protected ❷ or write-enabled ❸ position.
3. Insert the tape cartridge ❹.

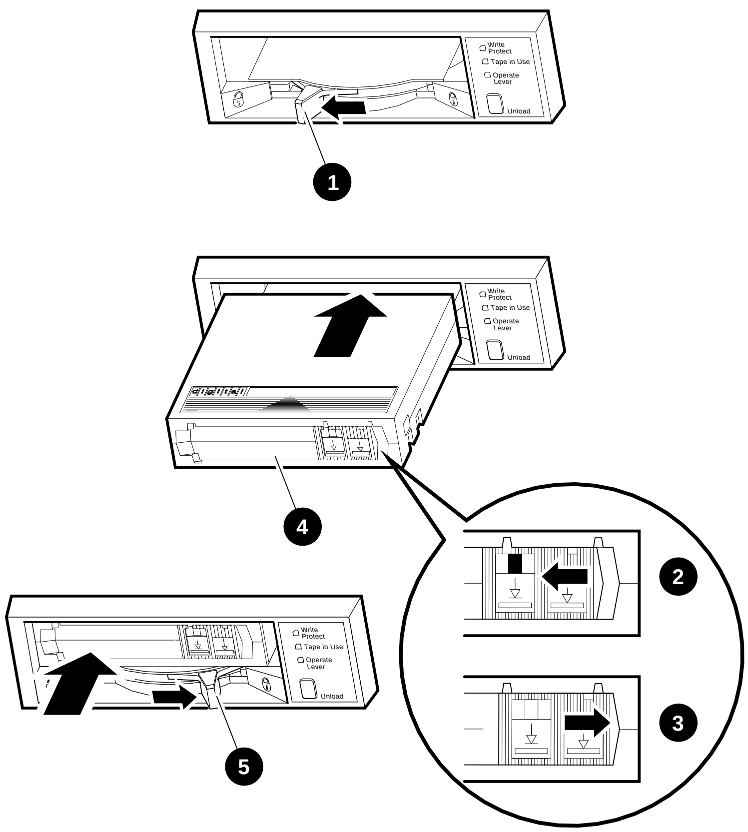
   The green light comes on.

   Once you have inserted the cartridge more than halfway into the drive, you must complete this procedure. If you wish to use another cartridge, complete this procedure and then perform the unload procedure to remove the tape.

   If you encounter resistance when attempting to insert the tape cartridge into the TZ30, remove the tape from the drive and move the cartridge lever to the lock position. Now move the cartridge lever back to the unlock position and reinsert the cartridge.
4. Move the cartridge lever to the lock position ❺, which locks the tape cartridge into the drive.

   The green light goes off and the yellow light begins to blink, which indicates that the tape is loading. When the tape is loaded (ready for use), the yellow light remains on and the green light remains off.

Figure 7–7 Inserting a Tape into the TZ30



Remove Tapes Before Power-Down

Caution

Remove tape cartridges from the TZ30 before turning off power to the drive or the system. Failure to do so can damage the cartridge and tape drive.

Removing a Tape from the TZ30

To remove a tape from the TZ30 drive (Figure 7–8):

1. Press the Unload button ❶.

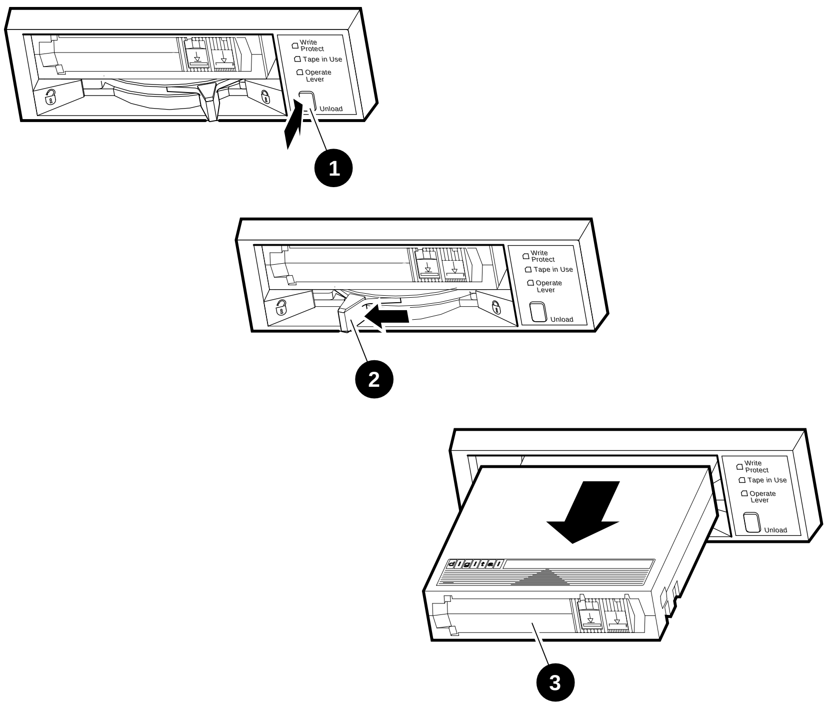
   The yellow light flashes while the tape rewinds. Wait for the tape to rewind fully: The beeper will sound twice and the green light will come on.

2. Move the cartridge lever to the unlock position ❷.

   The cartridge ejects.

3. Remove the tape from the drive ❸.

Figure 7–8 Removing a Tape from the TZ30



NUO-420-36-DG

TZ30 Lights

Table 7–4 summarizes the conditions indicated by the TZ30 lights.

Table 7–4 TZ30 Light Summary

Light	State	Condition
Green	On	Okay to operate the cartridge lever.
	Off	Do not operate the cartridge lever.
	Blinking	The drive detected a cartridge or calibration error.
Yellow	Blinking fast intermittently	Data is being written to the tape.
	Blinking fast continuously	Data is being read from the tape.
	Blinking slowly	Tape is initializing, loading, unloading, or rewinding.
	Blinking slowly, after the power-up diagnostic has run	Tape is initializing.
	On	Tape is loaded and ready for use.
Orange	On	Tape is write-protected.
	Off	Tape is write-enabled.
All three lights	On	The power-up diagnostic is in progress.
	Blinking	Drive fault has occurred.

Maintaining Mass Storage Media and Devices

Task Overview

Several tasks go hand-in-hand with using mass storage devices:

- Write-enabling and write-protecting media
- Labeling removable media
- Handling the media according to its care instructions
- Cleaning the device

Selecting a Media Write Setting

Mass storage media that can be read from or written to. For example, a TLZ06 removable tape has a write-protect feature that allows you to enable data to be written onto the media (write-enable) or to prevent data from being written onto the media and overwriting existing data (write-protect).

Switch the media setting back and forth, depending on the operation you wish to perform.

Media Setting	Operation
Write-enabled	Write data onto the media.
Write-protected	Protect data that has been written to the media from being accidentally overwritten.

For More Information

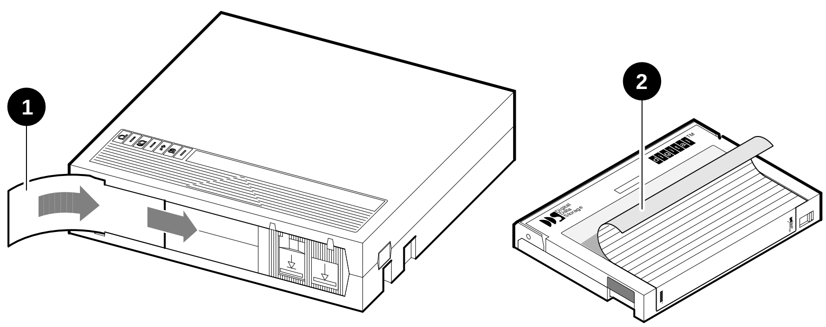
For information about setting the write-protect feature on a specific device, refer to the section on that device in this chapter.

Labeling Removable Media

Once you copy information onto removable media, label the contents of the media with the labels provided in the media's packaging.

Each type of tape has a label position, usually indicated by an indentation in the media. Affix labels only onto the designated label position. Figure 7–9 shows where to place a label on a CompacTape (❶) and on a DSS tape (❷).

Figure 7–9 Affixing Labels



Handling Media

Handle cassette tapes and compact discs carefully. The following sections provide care and handling instructions for cassette tapes and compact discs.

Note

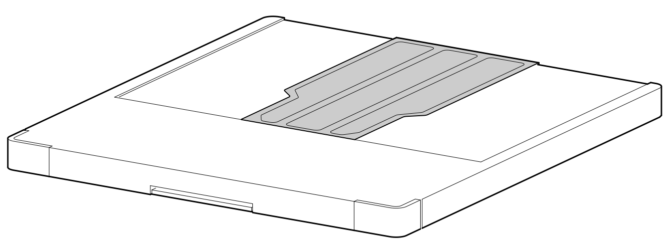
Over ninety percent of drive-related problems are associated with the media. Therefore, Digital strongly recommends that you follow the mass storage care and handling instructions described in the following sections.

Handling and Storing Discs and Caddies

Handle and store RRD42 discs and caddies as follows:

- Do not drop or strike the disc or the caddy.
- Do not disassemble the caddy.
- Store discs and caddies away from dust.
- Keep discs and caddies out of direct sunlight and away from heaters and other heat sources. Store discs and caddies at a constant temperature between 10°C and 40°C (50°F and 104°F), and where the relative humidity is between 10% and 90%.
- Do not touch the surface of a disc. Handle a disc by its edges.
- Wipe a disc with a compact disc cleaner when dust or fingerprints contaminate its surface.
- Never manually open the caddy shutter, shown in Figure 7–10, or touch the disc. The caddy shutter opens automatically when you insert the caddy into the drive.

Figure 7–10 Caddy Shutter



Handling and Storing Tapes

Cartridge tapes, used by all tape drives, store information on the magnetic surface of the tape. Do not touch these exposed magnetic surfaces.

If the tape leader is not in the correct position, do not try to fix it. Use a new cartridge instead.

Handle and store tape cartridges as follows:

- Keep tapes dry.
- Avoid dropping or banging the cartridge, which can displace the drive leader and make the tape unusable.
- Store tapes in moderate temperatures of between 10°C and 40°C (50° and 104°F).
- If a tape cartridge has been exposed to extreme heat or cold, allow the tape to stabilize at room temperature for the same amount of time it was exposed—up to 24 hours.
- Keep tapes out of direct sunlight and away from sources of heat.
- Keep tapes away from anything that contains a magnet or a magnetic field, such as a telephone or a computer monitor. Any tape exposed to a magnetic field can lose information.
- Store tapes in a dust-free area where the relative humidity is between 20% and 80%.
- Place an identification label only in the space provided for the label.

Cleaning the TLZ06

This section shows you how to perform TLZ06 head cleaning. The heads are the components in a drive that physically read and write data to and from the media (in this case, a cassette tape).

Digital recommends that you perform the head cleaning procedure about every 2 weeks, or after every 50 hours of drive usage.

Under normal conditions, it should not be necessary to exceed this cleaning schedule. If a particular data cassette causes problems, try changing to another data cassette.

Caution

Never attempt to clean the heads in a manner other than described here. Doing so may damage the drive tape head.

To clean the heads, use the head cleaning cassette as follows:

1. Make sure the power switch is in the on position (|) to apply power to the drive.
2. Insert the head cleaning cassette (part number TLZ04–HA) into the drive.
3. With the head cleaning cassette inserted, the drive automatically executes head cleaning. The drive ejects the head cleaning cassette after approximately 30 seconds.
4. In the space provided on the card enclosed with the head cleaning cassette, place a check mark every time you use the head cleaning cassette.

   Under normal conditions, the head cleaning cassette is good for approximately 25 cleanings. Additional cassettes are available from your Digital sales representative or DECdirect (800-DIGITAL).

   If the head cleaning cassette has been used more than 25 times, both the tape/activity and write-protect lights will flash. Press the eject button to remove the cleaning cassette. No cleaning action will have occurred.

Cleaning the TZ30

Clean the drive head as follows:

1. Insert the CleaningTape into the TZ30 using the instructions in Inserting a Tape into the TZ30 in this chapter.

   When cleaning is complete, the beeper sounds for you to remove the CleaningTape.

2. The drive head has been cleaned if the Use Cleaning Tape light goes off after the beeper sounds.

   If the Use Cleaning Tape light remains on after the beeper sounds, the drive head has not been cleaned and the cartridge has expired. Replace the cleaning cartridge. (The CleaningTape expires after approximately 20 uses.)

References

The following table describes where to find additional information about DEC 4000 AXP Rackmount mass storage devices.

Task	Document
Obtain a list of all DEC 4000 AXP Rackmount–compatible devices	*Systems and Options Catalog*
Write data to or from a drive	• In OpenVMS AXP, refer to *OpenVMS System Manager's Manual*. • In DEC OSF/1 AXP, refer to *DEC OSF/1 AXP Guide to System Administration*.
Mount a device	• In OpenVMS AXP, refer to *OpenVMS System Manager's Manual*. • In DEC OSF/1 AXP, refer to *DEC OSF/1 AXP Guide to System Administration*.

8

System Configuration

Chapter Description

Introduction

This chapter describes your system configuration and explains how to plan changes in the configuration.

Your system configuration is defined by the modules and mass storage devices inside your system, as well as the external options to which your system is connected. Your system configuration also includes the type of operating environment and applications.

In This Chapter

This chapter covers the following information:

- Identifying Your Configuration
- Special Configurations
- Identifying System Options
- Identifying Mass Storage Devices
- Displaying Configuration Information Online
- Planning a Change to Your Configuration
- Connecting Additional Devices to Your System
- Changing Drive ID Numbers (External Media)
- Setting and Examining Parameters for DSSI Devices
- Using the Power Control Bus with a Storage Expander

Identifying Your Configuration

Overview

You may need to know your system configuration in the following situations:

- When assigning an identification number to a device
- When ordering additional equipment
- When connecting to a network

Types of Configurations

Figure 8–1 illustrates the most common DEC 4000 AXP Rackmount configurations:

- Standalone system ❶ with or without external mass storage

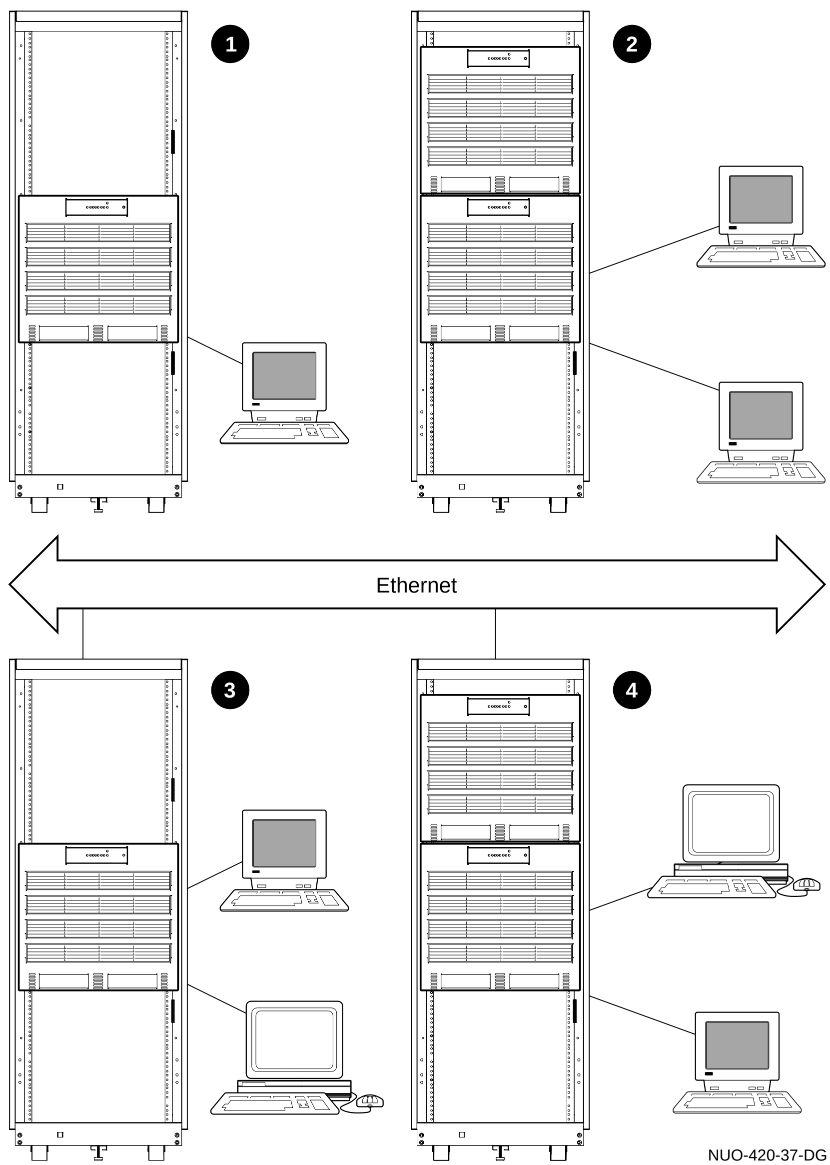
  A standalone system is not connected to any other systems or to a network. It can connect to multiple user terminals.
- Clustered system ❷ (OpenVMS AXP systems only)

  Two systems are connected. Total compute power is double the power of one system.
- Single-node system ❸ connected to a network

  A single system is connected to a network of systems.
- Clustered networked system ❹ (OpenVMS AXP systems only)

  Two systems are connected to each other and to a network of systems.

Figure 8–1 Types of Configurations



Special Configurations

Overview

The following special configurations create a unique system environment:

- Dual CPU systems
- DSSI VMScluster

Dual CPU Systems

A second CPU can be added to any DEC 4000 AXP Rackmount system. Adding a second CPU approximately doubles the computing power of the original system.

DSSI VMSCluster

A DSSI VMScluster configuration consists of two or more systems, running VMS software, configured as a DSSI cluster sharing their DSSI devices through a bus. Each system can have direct access to any of the devices on a shared DSSI bus; this can include a shared common disk.

The simplest DSSI VMScluster configuration, a two-system DSSI VMScluster, for example, can allow one system disk to be used as the system disk for both systems. The system disk physically resides in one enclosure; however, both systems have equal access to the system disk and to any other DSSI mass storage device in either enclosure.

A DSSI device, such as the RF73, has a built-in DSSI VMScluster capability that allows it to serve two or more systems simultaneously. The SCSI to DSSI adapters provided with systems having DSSI I/O modules allow you to extend a DSSI bus by physically connecting it to another system.

Benefits of a DSSI VMScluster

The benefits of a DSSI VMScluster configuration are:

- Cluster features such as shared data across systems and satellite nodes.
- High system availability. If one of the systems is unavailable, for example, due to a system malfunction, the satellites booted through it are able to continue operating through the other system.

If one of the systems fails, all satellite nodes booted through that system lose connections to the system disk. Each satellite node, however, can access the system disk through a second path. The satellite nodes establish a new connection through the other system and continue operation.

To increase system availability, a second system disk may be added to each boot node. If one system disk fails, the remaining system disk would continue to service one system and the satellite nodes booted through it.

Identifying System Options

Specifics of Your Configuration

In addition to your configuration type, your system configuration includes the following:

- System modules
- Mass storage devices
- External mass storage devices that are connected to the system (optional)
- Network components (optional)

The number and type of system modules, mass storage devices, and network components in your system depend on the configuration you have selected.

System Modules

The card cage at the rear of the system holds system modules. Your system includes a combination of the following:

- Up to two CPU modules
- One I/O module
- Up to four memory modules
- Up to six Futurebus+ modules

You can determine the number and type of modules in your system by reading the label that runs lengthwise on each module.

Internal Mass Storage Devices

Internal mass storage devices are located in the tray at the bottom of your system.

For information about how to identify the devices in your system, refer to Identifying Mass Storage Devices .

The DEC 4000 AXP Rackmount does not require the device mounting brackets included with internal disk and tape options. These may be discarded. Mounting brackets are provided in the bottom tray of the DEC 4000 AXP Rackmount.

External Mass Storage Devices

Your system can support devices that are outside the system unit (external devices) in addition to the devices that are in the system. External devices can sit or stand alone beside your system, or they can be housed in a separate enclosure, such as the R400X mass storage expander.

For a list of the devices that can be connected to your system, refer to the *Systems and Options Catalog*, or contact your Digital sales representative.

For information about how to connect an external mass storage device to your system, refer to Connecting Additional Devices to Your System , later in this chapter.

Network Devices

Depending on the configuration you selected, your system comes with one or two Ethernet ports on the I/O module.

Each Ethernet port has two associated ports: thickwire (standard Ethernet) and ThinWire. You select either thickwire or ThinWire with a switch that is located halfway between the thickwire and the ThinWire ports. You can connect to a twisted-pair Ethernet by connecting a twisted-pair H3350 media access unit to the thickwire port, using a standard transceiver cable.

Identifying Mass Storage Devices

DSSI and SCSI Devices

In addition to the SCSI devices in the bottom tray, both DSSI and SCSI mass storage devices can be connected to your system via connectors at the rear of the chassis. The devices from a single connector, however, are either SCSI devices or DSSI devices. Refer to Connecting Additional Devices to Your System later in this chapter.

Displaying Configuration Information Online

Overview

You can examine information about your system configuration on line from console mode by entering a command at your console terminal. The system responds by displaying information about the topic that you specify.

You can display information about the following topics:

- System configuration
- Memory
- Mass storage devices
- Console program
- Privileged Architecture Library code (PALcode)

If a configuration screen does not show what you expect or what you ordered, there may be a problem with your system. Contact your Digital representative.

Displaying System Configuration

To display system configuration information from console mode, enter `show config` at the console prompt:

```
>>> show config
```

Your system configuration is displayed on the terminal screen. Example 8–1 shows a possible system configuration display.

Example 8–1 System Configuration Display

```
>>> show config [Return]

     Console T2.4-2859                VMS PALcode X5.12F, OSF PALcode X1.09B

    ❶             ❷      ❸

    CPU 0          P    B2001-AA DECchip (tm) 21064-2
    CPU 1          -
    Memory 0       P    B2002-DA 128 MB
    Memory 1       -
    Memory 2       -
    Memory 3       -
    Ethernet 0     P    08-00-2B-1D-02-8F
    Ethernet 1     P    08-00-2B-1D-02-90
                        ID 0   ID 1   ID 2   ID 3   ID 4   ID 5   ID 6   ID 7
    A     SCSI     P                  RZ57                               Host
    B              P
    C     DSSI     P           RF72                                      Host
    D     SCSI     P    RZ35   RZ35          RZ35                        Host
    E     SCSI     P           TLZ04                                     Host
    Futurebus+     P           -      -      -      -      -      -

    System Status Pass         Type b to boot

>>>
```

❶ Module, network component, or mass storage bus label

❷ Component's status after last self-test: either “P” for pass or “F” for fail.

❸ Description of the component: describes modules, provides Ethernet addresses, and lists the devices on each mass storage bus.

Displaying Memory Information

To display memory information from console mode, enter `show memory` at the console prompt.

```
>>> show memory
```

Your system memory is displayed on the terminal screen. Example 8–2 shows a possible memory configuration display.

Example 8–2 Memory Configuration Display

```
>>> show memory [Return]
>>>show memory

  ❶        ❷         ❸           ❹           ❺          ❻
Module   Size     Base Addr   Intlv Mode  Intlv Unit  Bad Pages
------   -----    ---------   ----------  ----------  ---------
  0      Not Installed
  1      Not Installed
  2      Not Installed
  3      128Mb    00000000      1-Way         0           0

>>>
```

❶ Module slot number

❷ Size of memory module

❸ Base or starting address of memory module

❹ Interleave mode—number of modules interleaved (1–4-way interleaving)

❺ Interleave unit number

❻ Number of bad pages in memory (8 K/page)

Displaying Device Information

To display device information from console mode, enter `show device` at the console prompt.

```
>>> show device
```

Your device configuration is displayed on the terminal screen. Example 8–3 shows a possible device configuration display.

Example 8–3 Device Configuration Display

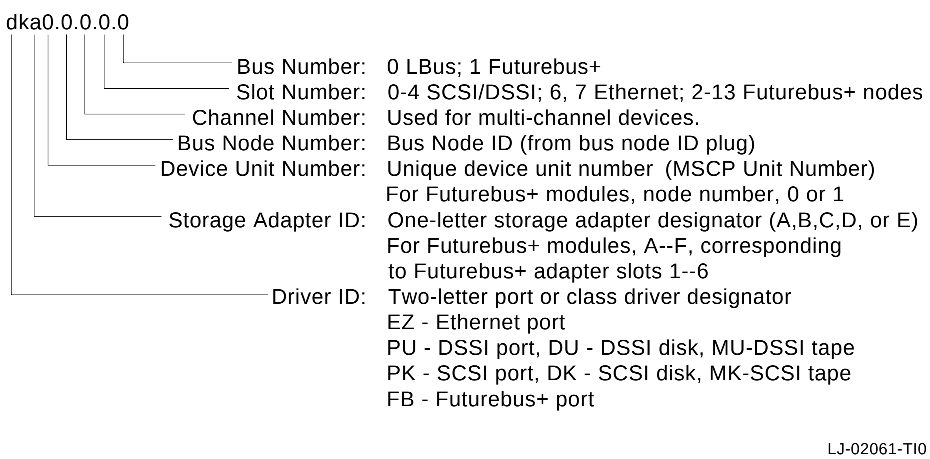
```
>>> show device Return
dka200.2.0.0.0          DKA200                         RZ57
dkd0.0.0.3.0            DKD0                           RZ35
dkd100.1.0.3.0          DKD100                         RZ35
dkd300.3.0.3.0          DKD300                         RZ35
duc1.1.0.2.0            $1$DIA1 (RF0201)               RF72
mke100.1.0.4.0          MKE100                        TLZ04
eza0.0.0.6.0            EZA0                08-00-2B-1D-02-8F
ezb0.0.0.7.0            EZB0                08-00-2B-1D-02-90
p_b0.6.0.1.0                                       Bus ID 6
pka0.7.0.0.0            PKA0                  SCSI Bus ID 7
pkd0.7.0.3.0            PKD0                  SCSI Bus ID 7
pke0.7.0.4.0            PKE0                  SCSI Bus ID 7
puc0.7.0.2.0            PIC0                  DSSI Bus ID 7
>>>
```

Note

If no devices or terminators are present for a SCSI-2/DSSI bus, the display will show an indeterminant device type for that controller, such as p_a0 or p_b0.

The device naming convention is shown in Figure 8–2.

Figure 8–2 Device Name Convention



Note

Slot numbers for SCSI-2/DSSI buses (0–4) correspond to mass storage buses as follows:

External Media:

Bus A, Slot 0
Bus B, Slot 1
Bus C, Slot 2
Bus D, Slot 3

Internal/External SCSI Media:

Bus E, Slot 4

Displaying Console Program Version

To display the version of the console program that you are using, enter `show version` at the console prompt.

```
>>> show version
```

The version of the console program that your system is using is displayed on the terminal screen. Example 8–4 shows a possible console program version.

Example 8–4 Console Program Version

```
>>> show version Return
version                 T2.1-213 Jul 28 1992 01:01:25
```

Displaying PALcode Version

Privileged Architecture Library code, (PALcode) written for AXP processors, implements architecturally defined behavior.

To display the version of PALcode that you are using, enter `show pal` at the console prompt:

```
>>> show pal
```

The version of PALcode that your system is using is displayed on the terminal screen. Example 8–5 shows a possible PALcode version.

Example 8–5 PALcode Version

```
>>> show pal Return
pal                     VMS PALcode X5.04A, OSF PALcode X1.04A
```

Planning a Change to Your Configuration

Perform Pre-Upgrade Tasks

Although the replacement or addition of system hardware is generally performed by Digital Services, you should plan an upgrade by performing the following tasks:

1. Discuss with your sales representative how you wish to change your system: the options you wish to add and whether they are compatible with your system.
2. Obtain a copy of the *Systems and Options Catalog* from your Digital sales representative and fill out the DEC 4000 AXP Rackmount configuration worksheet that can be found in the catalog.
3. Order the options and arrange for Digital Services to install them.

For information about current products, refer to Digital's latest *Systems and Options Catalog*. To obtain a copy, contact your Digital sales representative.

Adding Third-Party Devices

You can connect third-party SCSI, or licensed DSSI devices to the system by extending one of the system's mass storage buses. See Terminating and Extending a DSSI Bus, later in this chapter.

Connecting Additional Devices to Your System

External Media Expansion Ports

External media expansion ports on the rear of the chassis enable you to extend the bus that is connected to that port outside the system. As a result, you can connect external mass storage devices, either standalone devices or devices in an expander, such as the R400X, to the buses inside your system. Note, however, that you can only connect DSSI devices to a DSSI bus and only SCSI devices to a SCSI bus.

Figure 8–3 shows the location of the bus expansion ports on the DEC 4000 AXP Rackmount system.

DSSI/SCSI Ports

Each expansion port is accessed via a SCSI 50-pin IEEE connector. The port in this configuration is intended to connect to single-ended SCSI devices only. Terminator power is provided by the port on the appropriate pins.

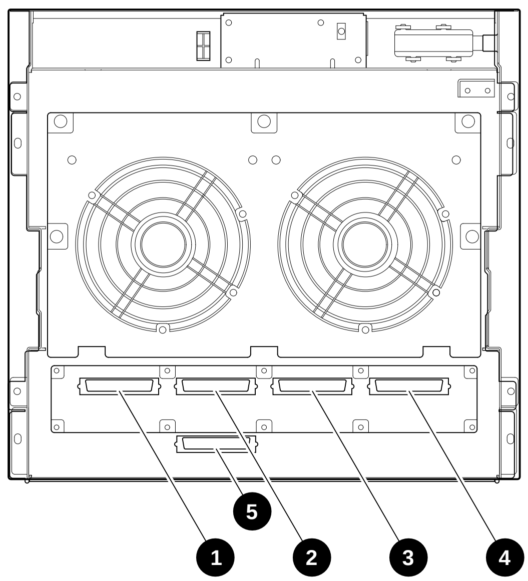
To connect a DSSI bus, attach one of the supplied SCSI/DSSI adapters (P/N 12-39838-01) to the desired port. The 50-pin D connector end of the plug is configured in a DSSI pinout scheme, which can be attached to external DSSI devices. The adapter flags the processor that the port is to be utilized as a DSSI device. However, this only occurs if the adapter is attached before system initialization takes place. If the adapter is attached after system power up, the port remains in a SCSI configuration. Each bus can support up to seven devices using ports A through D.

Extending the Internal Bus (SCSI Only)

The internal storage compartment can hold up to four mass storage devices, however, the bus supports up to seven mass storage devices.

Additional devices can be attached to this bus by extending port E (see Figure 8–3) to the desired external media.

Figure 8–3 Mass Storage Bus Expansion Ports



❶ Bus A expansion port

❷ Bus B expansion port

❸ Bus C expansion port

❹ Bus D expansion port

❺ Bus E expansion port[1]

[1] Bus E expansion port is for SCSI use only.

Terminating and Extending a SCSI Bus

To extend a SCSI bus, you attach a SCSI bus expansion cable to the bus expansion port and attach the other end of the cable into the external SCSI device.

Terminate any unused ports by attaching an H8574-A SCSI terminator (P/N 12-30552-01) to the bus expansion port.

Terminating and Extending a DSSI Bus

To extend a DSSI bus, first you attach the SCSI/DSSI adapter (P/N 12-39838-01) described in DSSI/SCSI Ports. Then you attach a DSSI bus expansion cable to the bus expansion port and attach the other end of the cable into the external DSSI device.

Example of Terminating and Extending a Bus

Figure 8–4 shows a system with SCSI terminators and extended DSSI and SCSI buses.

- Bus A, in the example, is a DSSI bus.

  Extend a DSSI bus by attaching a SCSI/DSSI adapter (P/N 12-39838-01), then a DSSI expansion cable ➍ into the bus expansion port.

- Bus E, in the example, is a SCSI bus.

  Terminate a SCSI bus by attaching a SCSI terminator ➊ into the bus expansion port.

  Extend a SCSI bus by attaching a SCSI expansion cable ➌ into the bus expansion port.

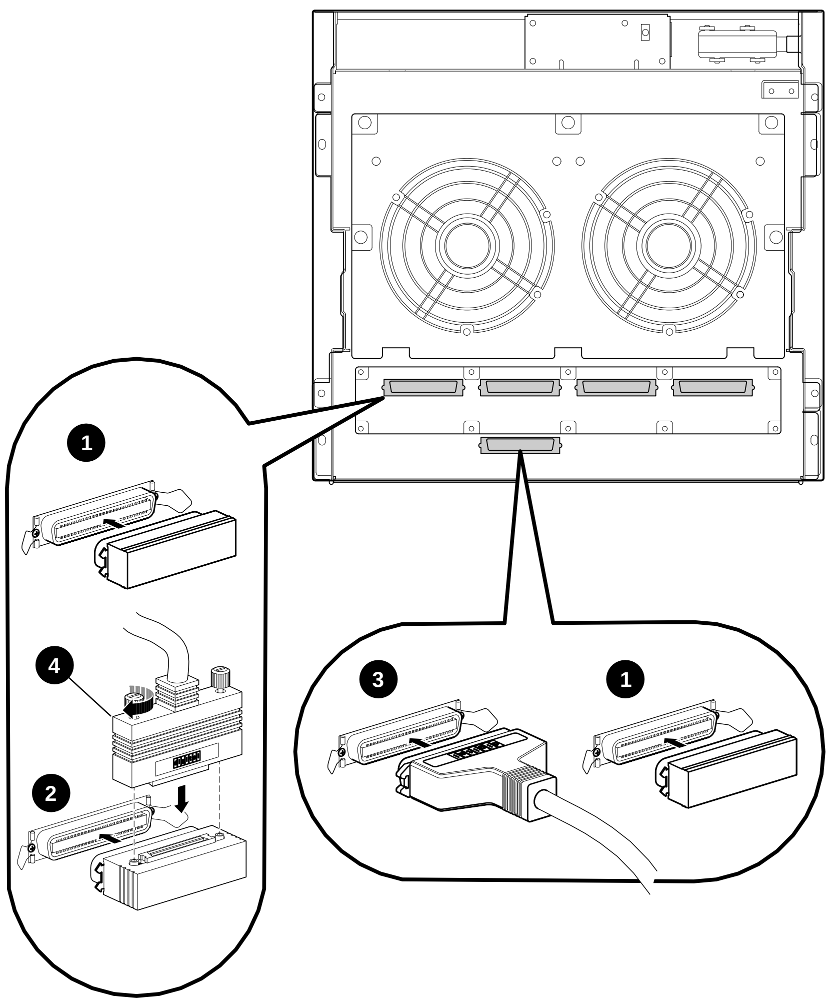
You can terminate a DSSI bus by removing the SCSI/DSSI adapter and using the SCSI terminator as shown in Figure 8–4. You can also terminate the DSSI bus by attaching a DSSI terminator to the SCSI/DSSI adapter (not shown in figure).

Terminating an Extended Bus

Always terminate a bus. If you extend a bus, move the terminator (either DSSI or SCSI to match the bus) from the bus expansion port on the system to the bus expansion port or connector on the expansion enclosure or standalone device.

For information about attaching a terminator to an R400X expander, refer to the *R400X Expander Installation* (EK–R400X–CM).

Figure 8–4 Terminating and Extending a Bus



Changing Drive ID Numbers (External Media)

When to Change Drive ID Numbers

Refer to your external media documentation for instructions on when and how to set ID numbers.

Note

If you cluster two or more DSSI systems, you may need to set DSSI parameters instead of changing drive ID numbers. For information about setting DSSI parameters, refer to Setting and Examining Parameters for DSSI Devices later in this chapter.

Changing a Drive ID: Rules

Use the following rules to decide how to renumber your storage devices:

- For each bus, do not duplicate drive ID numbers for storage devices/adapters. For Bus A, you can have only one storage device identified as drive 0, one storage device as drive 1, and so on; for Bus B, you can have only one storage device identified as drive 0, one storage device as drive 1, and so on.
- By convention, the fixed-disk drives are numbered in increasing order from right to left, beginning with zero.
- Adapters use the highest available drive ID numbers.
- The controller ID number is 7.

Note

External media must have only one terminator located at the end of the bus. Ensure terminator resistor paks are removed from any drives located at intermediate points on a multidrive string. If an external terminator is used, remove all resistor paks.

Setting and Examining Parameters for DSSI Devices

When to Change DSSI Device Parameters

You may need to change DSSI device parameters under the following circumstances:

- If you reconfigure your system to include DSSI devices in an expander
- If you create a DSSI VMScluster configuration

Changing DSSI Device Parameters: Rules

Use the following rules to decide how to renumber your DSSI storage devices:

- For each DSSI bus, do not duplicate drive ID numbers for storage devices/adapters. For Bus A, you can have only one storage device identified as drive 0, one storage device as drive 1, and so on; for Bus B, you can have only one storage device identified as drive 0, one storage device as drive 1, and so on. (See the previous section, Changing Drive ID Numbers (External Media) , for information about changing a drive's ID number.)
- When more than one DSSI bus is being used and the system is using a nonzero allocation class, you need to assign new MSCP unit numbers for devices on all but one of the DSSI buses. This is necessary because the unit numbers for all DSSI devices connected to a system's associated DSSI buses must be unique.

Using cdp and show device du pu Commands

You set and examine DSSI device parameters by using the `show device du pu` and `cdp` console commands:

- `show device du pu` — displays information for each DSSI device on the system (`du` specifies drives, `pu` specifies storage adapters).
- `cdp` — allows you to modify the following device parameters from console mode: NODENAME, ALLCLASS, and UNITNUM. The `cdp` command automatically connects to the device's DUP driver for all devices or any number of specified devices.

show device du pu

The `show device du pu` command displays information for all DSSI devices in the system. The `du` argument lists all DSSI drives; the `pu` argument lists the storage adapters for all DSSI buses found on the system.

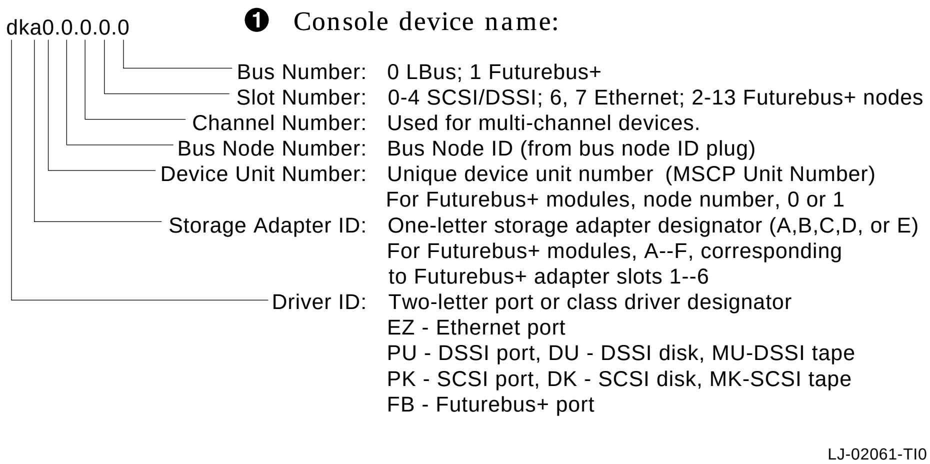
Synopsis:

`show device du pu`

Example:

```
>>> show device du pu
   ❶                    ❷       ❸                     ❹
dua0.0.0.0.0          $2$DIA0 (ALPHA0)              RF35
dua1.1.0.0.0          $2$DIA1 (ALPHA1)              RF35
dua2.2.0.0.0          $2$DIA2 (ALPHA2)              RF35
dua3.3.0.0.0          $2$DIA3 (ALPHA3)              RF35
pua0.7.0.0.0          PIA0                   DSSI Bus ID 7
pub0.7.0.1.0          PIB0                   DSSI Bus ID 7
>>>
```

❶ Console device name:



❷ Operating system device name:

- For an allocation class of zero: NODENAME$DIA*u*

  NODENAME is a unique node name and *u* is the unit number. For example, R7BUCC$DIA0.

- For a nonzero allocation class:

  $ALLCLASS$DIA*u*

ALLCLASS is the allocation class for the system and devices, and *u* is a unique unit number. For example, 1DIA0.

❸ Node name (alphanumeric, up to six characters)

❹ Device type

cdp

The `cdp` command allows you to modify NODENAME, ALLCLASS, and UNITNUM from the console program without explicit connection to a node's DUP server.

For more information about the `cdp` command, refer to cdp in Chapter 5.

DSSI Device Parameters: Definitions and Function

Five principal parameters are associated with each DSSI device:

- Drive ID
- ALLCLASS
- UNITNUM
- NODENAME
- SYSTEMID

Note

ALLCLASS, NODENAME, and UNITNUM are examined and modified using the `cdp` command.

SYSTEMID is examined and modified using the console-based Diagnostic and Utility Program (DUP) driver utility.

The drive ID is physically determined by the numbered drive ID plug that inserts into the front panel of the storage compartment.

A brief description of each parameter follows.

DSSI Device Parameter Descriptions

Drive ID

The drive ID parameter is provided by the drive ID plug on the front panel of the external storage compartment if so equipped, otherwise the ID parameter is set by jumpers on the individual devices. See your documentation for the external storage media for specific information. Each DSSI bus can support up to eight devices, (drive IDs 0–7). Each DSSI adapter and each device count as a node. Hence, in a single-system configuration, a DSSI bus can support up to seven devices, drive IDs 0–6 (with drive ID 7 reserved for the adapter).

ALLCLASS

The ALLCLASS parameter determines the device allocation class. The allocation class is a numeric value from 0–255 that is used by the OpenVMS AXP operating system to derive a path-independent name for multiple access paths to the same device. The ALLCLASS parameter corresponds to the OpenVMS AXP IOGEN parameter ALLOCLASS.

DSSI devices are shipped from the factory with a default allocation class of zero. Each device to be served to a cluster must have a nonzero allocation class that matches the allocation class of the system. Refer to the *VMS VAXcluster Manual* for rules on specifying allocation class values.

UNITNUM

The UNITNUM parameter determines the unit number of the device. By default, the device unit number is supplied by the drive ID plug on the front panel of the storage compartment. Systems using multiple DSSI buses, as described later in this section, require that the default values be replaced with unique unit numbers. To set unit numbers and override the default values, you use the `cdp` console command to supply values to the UNITNUM parameter.

NODENAME

The NODENAME parameter allows each device to have an alphanumeric node name of up to six characters. DSSI devices are shipped from the factory with a unique identifier, such as R7CZZC, R7ALUC, and so on. You can provide your own node name.

SYSTEMID

The SYSTEMID parameter provides a number that uniquely identifies the device to the operating system.

How OpenVMS AXP Uses the DSSI Device Parameters

This section describes how the OpenVMS AXP operating system uses the parameters to form unique identifiers for each device. Configurations that require you to assign new unit numbers for devices are also described.

- With an allocation class of zero, the operating system can use the default parameter values to provide each device with a unique device name. The operating system uses the node name along with the device logical name in the following manner:

  NODENAME$DIA*u*

  NODENAME is a unique node name and *u* is the unit number.

- With a nonzero allocation class, the operating system uses unit number values to create a unique device name. The operating system uses the allocation class along with the device logical name in the following manner:

  $ALLCLASS$DIA*u*

  ALLCLASS is the allocation class for the system and devices, and *u* is a unique unit number.

With DEC 4000 AXP Rackmount systems, you can fill multiple DSSI buses: buses A–D (slot numbers 0–3). Each bus can have up to seven DSSI devices (drive IDs 0–6). When more than one bus is being used, and your system is using a nonzero allocation class, you need to assign new unit numbers for devices on all but one of the DSSI buses, since the unit numbers for all DSSI storage devices connected to a system's associated DSSI buses must be unique.

Figure 8–5 illustrates the problem of duplicate operating system device names for a system that is using more than one DSSI bus and a nonzero allocation class. In the case of the nonzero allocation class, the operating system sees four of the devices as having duplicate device names. This is an error, as all unit numbers must be unique. The unit numbers for one of the two DSSI buses in this example need to be reprogrammed.

Figure 8–5 How OpenVMS AXP Sees Unit Numbers for DSSI Devices

Allocation Class=0	Nonzero Allocation Class (Example: ALLCLASS=1)	
R7BUCC$DIA0	1DIA0	*Duplicate 0
R7CZZC$DIA1	1DIA1	*Duplicate 1
R7ALUC$DIA2	1DIA2	*Duplicate 2
R7EB3C$DIA3	1DIA3	*Duplicate 3
R7IDFC$DIA0	1DIA0	
R7IBZC$DIA1	1DIA1	
R7IKJC$DIA2	1DIA2	
R7ID3C$DIA3	1DIA3	
R7XA4C$DIA4	1DIA4	
R7QIYC$DIA5	1DIA5	
R7DA4C$DIA6	1DIA6	

* Nonzero allocation class examples with an asterisk indicate duplicate device names.
For one of the DSSI buses, the unit numbers need to be reprogrammed to avoid this error.

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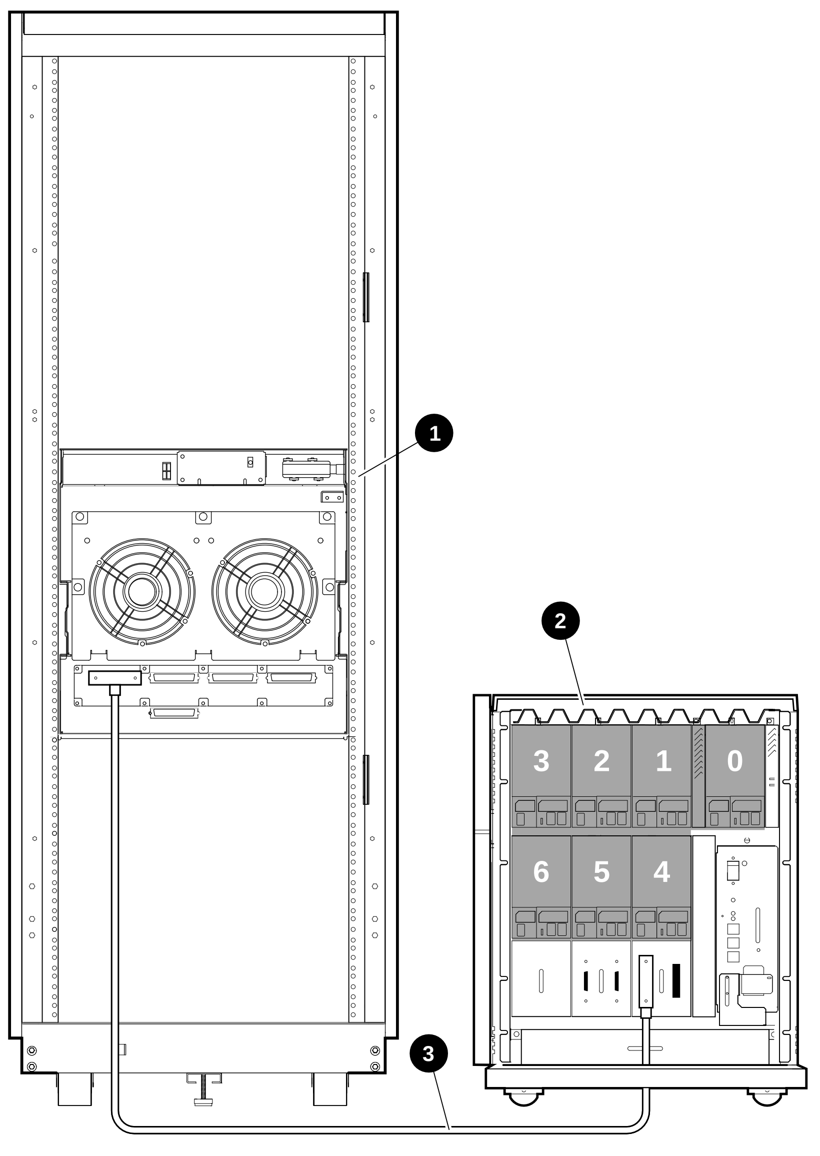
Example: Modifying DSSI Device Parameters

Figure 8–6 shows sample DSSI buses and drive IDs for a sample expanded DEC 4000 AXP Rackmount system.

Following Figure 8–6 is an example in which the allocation class will be set to 1, the devices for Bus A (in the DEC 4000 AXP Rackmount) will be assigned new unit numbers (to avoid the problem of duplicate unit numbers), and the system disk will be assigned a new node name.

❶ System ❸ Cable
❷ Expander

Figure 8–6 Sample DSSI Buses for an Expanded DEC 4000 AXP Rackmount System



In this part of the example, the system displays all DSSI devices.

```
>>> show device du pu

dua0.0.0.0.0              $2$DIA0 (ALPHA0)            RF35
dua1.1.0.0.0              $2$DIA1 (ALPHA1)            RF35
dua2.2.0.0.0              $2$DIA2 (ALPHA2)            RF35
dua3.3.0.0.0              $2$DIA3 (ALPHA3)            RF35
dub0.0.0.1.0              $2$DIA0 (SNEEZY)            RF73
dub1.1.0.1.0              $2$DIA1 (DOPEY)             RF73
dub2.2.0.1.0              $2$DIA2 (SLEEPY)            RF73
dub3.3.0.1.0              $2$DIA3 (GRUMPY)            RF73
dub4.4.0.1.0              $2$DIA4 (BASHFUL)           RF73
dub5.5.0.1.0              $2$DIA5 (HAPPY)             RF73
dub6.6.0.1.0              $2$DIA6 (DOC)               RF73
pua0.7.0.0.0              PIA0                        DSSI Bus ID 7
pub0.7.0.1.0              PIB0                        DSSI Bus ID 7
```

In the next part of the example, the system assigns ALLCLASS of 1 to all drives in the system; assigns UNITNUM 10, 11, 12, and 13 to the drives on Bus A.

```
>>> cdp -sa 1 -su 10 dua*

pua0.0.0.0.0    ALPHA0     0411214901371     1  10  $1$DIA10
pua0.1.0.0.0    ALPHA1     0411214901506     1  11  $1$DIA11
pua0.2.0.0.0    ALPHA2     041122A001625     1  12  $1$DIA12
pua0.3.0.0.0    ALPHA3     0411214901286     1  13  $1$DIA13
pub0.0.0.1.0    SNEEZY     0411214906794     1  0   $1$DIA0
pub1.1.0.1.0    DOPEY      0411214457623     1  1   $1$DIA1
pub2.2.0.1.0    SLEEPY     0478512447890     1  2   $1$DIA2
pub3.3.0.1.0    GRUMPY     0571292500565     1  3   $1$DIA3
pub4.4.0.1.0    BASHFL     0768443122700     1  4   $1$DIA4
pub5.5.0.1.0    HAPPY      0768443122259     1  5   $1$DIA5
pub6.6.0.1.0    DOC        0768442231111     1  6   $1$DIA6
```

In the next part of the example, the user modifies the NODENAME for the specified drive.

```
>>> cdp -n dub0

pub0.0.0.1.0:
Node Name [SNEEZY]? SYSTEM

>>> show device du pu
```

```
dua10.0.0.0.0          $1$DIA10 (ALPHA0)          RF35
dua11.1.0.0.0          $1$DIA11 (ALPHA1)          RF35
dua12.2.0.0.0          $1$DIA12 (ALPHA2)          RF35
dua13.3.0.0.0          $2$DIA13 (ALPHA3)          RF35
dub0.0.0.1.0           $1$DIA0  (SYSTEM)          RF73
dub1.1.0.1.0           $1$DIA1  (DOPEY)           RF73
dub2.2.0.1.0           $1$DIA2  (SLEEPY)          RF73
dub3.3.0.1.0           $1$DIA3  (GRUMPY)          RF73
dub4.4.0.1.0           $1$DIA4  (BASHFL)          RF73
dub5.5.0.1.0           $1$DIA5  (HAPPY)           RF73
dub6.6.0.1.0           $1$DIA6  (DOC)             RF73
pua0.7.0.0.0           PIA0                       DSSI Bus ID 7
pub0.7.0.1.0           PIB0                       DSSI Bus ID 7
>>>
```

Using the Power Control Bus with a Storage Expander

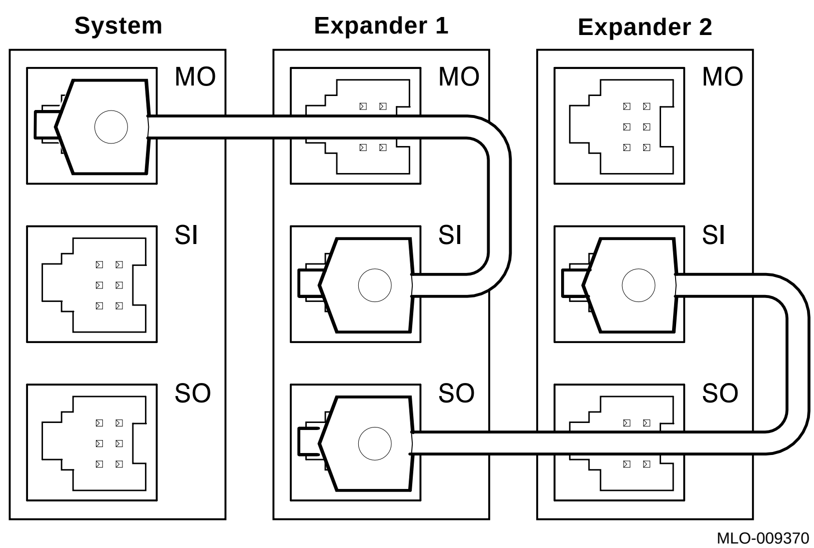
Power Control Bus for Expanded Systems

The three power bus connectors on the power system controller at the top of the DEC 4000 AXP Rackmount system allow you to configure a power bus for storage systems external to the main chassis. The power bus allows you to turn power on and off for one or more external storage systems through the power supply designated as the main power supply. Figure 8–7 shows a sample power bus configuration. Figure 1–7 shows the power bus connector locations.

Note

DSSI VMScluster systems should not be configured with a power bus. Inadvertently bringing down the cluster defeats the added reliability of a DSSI VMScluster.

Figure 8–7 Sample Power Bus Configuration



References

The following table describes where to find additional configuration information.

Task	Document
Review available options	*Systems and Options Catalog*
Connect your system to the network	*Network Installation Guide*

9

Learning More About Your System

Chapter Description

Introduction

This chapter describes your system's design and the design of its subsystems and components.

In This Chapter

This chapter covers the following information:

- System Features
- Subsystems and Components
- CPU Subsystem
- Power Subsystem
- Storage Subsystem
- Futurebus+ Subsystem

System Features

What Makes It a DEC 4000 AXP Rackmount System?

The following characteristics define the DEC 4000 AXP Rackmount system:

- Alpha AXP architecture
- RISC technology
- Support of multiple operating systems
- Integration with VAX hardware and VMS and OSF/1 software and VAX investment protection
- DSSI VMScluster support
- 19-inch EIA form factor

Alpha AXP Architecture

The DEC 4000 AXP Rackmount system is part of a family of flagship computers that are based on the new Alpha AXP system architecture. Alpha AXP architecture employs the DECchip 21064 microprocessor, which is located on the CPU module of each Alpha AXP system. The 21064 chip employs RISC technology.

RISC Technology

RISC (Reduced Instruction Set Computer) technology uses an instruction set that is reduced in complexity. High-level compilers synthesize the more complex, least frequently used instructions by breaking them down into simpler instructions. This approach allows the RISC architecture to implement a small, hardware-assisted instruction set, thus eliminating the need for microcode.

The Alpha AXP RISC technology provides exceptionally fast compute power to the DEC 4000 AXP Rackmount system.

Support of Multiple Operating Systems

Currently, the DEC 4000 AXP Rackmount can run two different operating systems:

- OpenVMS AXP
- DEC OSF/1 AXP

The NT AXP operating system and other operating systems are planned to be supported in the future.

Integration with Existing Technology

The DEC 4000 AXP Rackmount system is designed to be compatible with existing technology:

- VAX hardware

  DEC 4000 AXP Rackmount, like all Alpha AXP systems, can connect to your existing VAX hardware in clusters and networks.
- VMS and UNIX software environments

  By upgrading the operating system software, existing versions of VMS or OSF/1 can support any Alpha AXP system.

DSSI VMScluster Support

A DSSI VMScluster configuration consists of two or more systems, running VMS software, configured as a DSSI cluster sharing their DSSI devices through a bus. Each system can have direct access to any of the devices on a shared DSSI bus; this can include a shared common disk.

Subsystems and Components

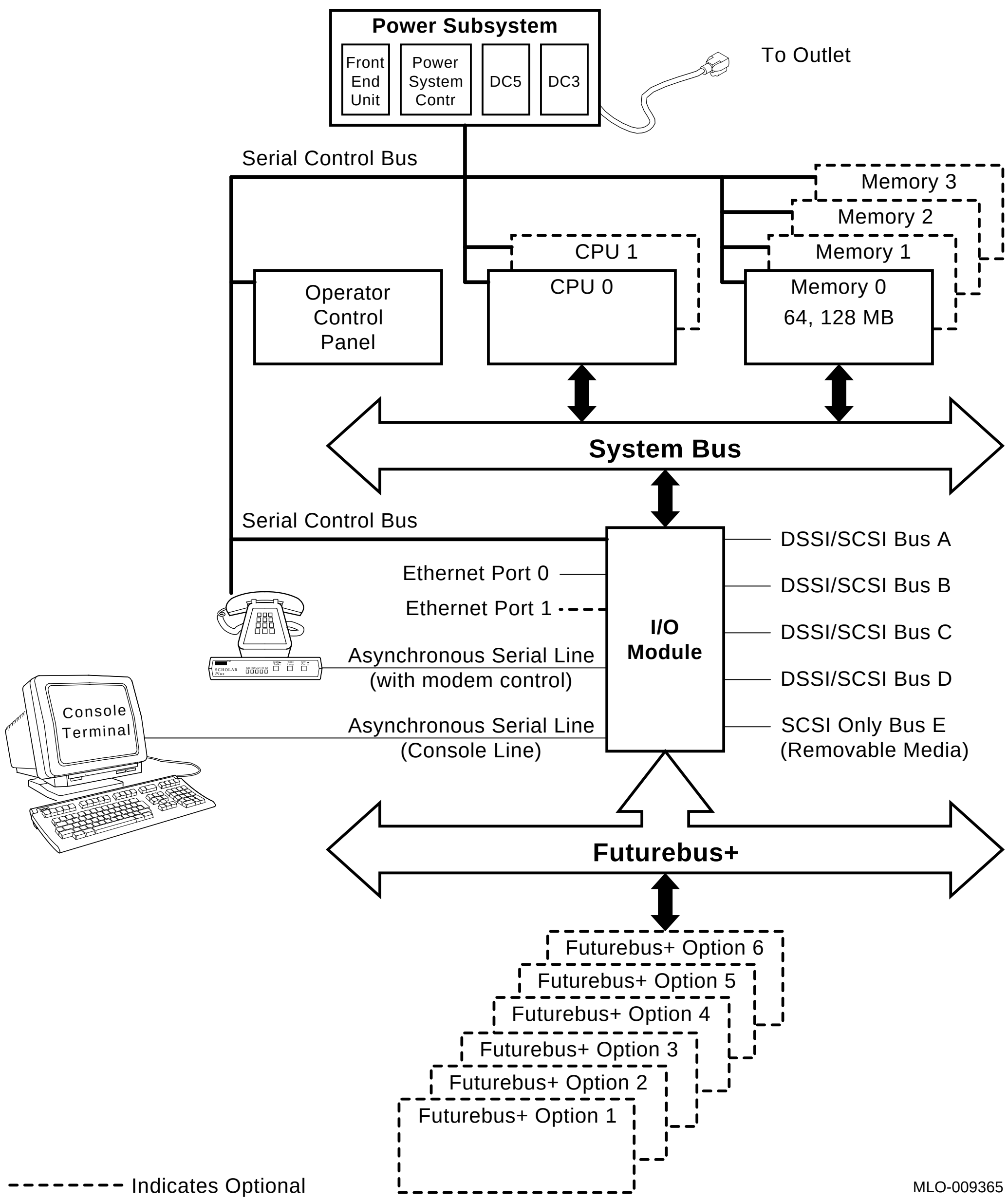
Overview

The subsystems that make up the DEC 4000 AXP Rackmount system are described in Table 9–1 and shown in Figure 9–1.

Table 9–1 DEC 4000 AXP Rackmount Subsystems

Subsystem	Features
System bus	Supports: • Up to two CPU modules • Up to four memory modules. Each module can provide 64, or 128 MB of memory. • One I/O module
Power subsystem	Supports 20-ampere systems, providing up to 1480 watts
I/O Module	Supports: • Two fixed-media SCSI devices • Two internal removable-media SCSI devices • Up to 35 drives total (includes fixed and removable), 31 external devices
Futurebus+	Industry-standard high-performance bus

Figure 9–1 DEC 4000 AXP Rackmount System Architecture



CPU Subsystem

Components

The CPU subsystem consists of the following components:

- System bus
- Central processing units (1 or 2)
- Memory modules (1 to 4)
- I/O module

System Bus

The system bus interconnects the CPUs, memory modules, and I/O module. The I/O module provides access to basic I/O functions (network, storage devices, and console program). The I/O module also is the bridge to the I/O expansion bus, Futurebus+.

The system bus is a shared-memory bus designed to support the Alpha AXP architecture and up to two processors. It supports a “snooping protocol” that allows a CPU’s first-level write-through cache and second-level write-back cache to maintain consistent data with another processor’s caches, system memory, and the I/O port on a transaction-by-transaction basis.

The system bus is a synchronous, multiplexed interconnect that can transfer a 34-bit address or a 128-bit data with 32-bit parity in a single cycle. Two CPU modules and an I/O module arbitrate for the system bus via a prioritized scheme that allows the I/O module to interleave with the two CPU modules. The arbitration function and system bus clock generators are located on the CPU 1 module.

Central Processing Unit

The KN430 CPU module houses the DECchip 21064 processor, which implements the Alpha architecture. The system supports up to two CPU modules in a symmetric multiprocessing configuration.

The CPU controls the execution of all instructions and processes. The CPU circuits contain the logic, arithmetic, and control functions used by the system.

Memory Module

Main memory provides the electrical storage area for data and instructions used by the CPU. DEC 4000 AXP Rackmount systems support from one to four memory modules.

Each memory module features the following:

- Error detection and correction (EDC) logic
- Memory interleaving across two or four modules of like sizes
- Read prefetch buffers
- Write transaction buffers
- Block exchange
- Read data wrapping
- Intelligent refresh control

I/O Module

Each system has an I/O (input/output) module that allows the system to access mass storage, backup, and network resources.

The I/O module contains the following:

- One or two Ethernet ports, based on the third-generation Ethernet chip (TGEC).

  Each Ethernet port has two associated ports: thickwire (standard Ethernet) and ThinWire. You select either thickwire or ThinWire with a switch that is located halfway between the thickwire and the ThinWire ports. You can connect to a twisted-pair Ethernet by connecting a twisted-pair H3350 media access unit to the thickwire port, using a standard transceiver cable.
- Futurebus+ Profile B interface (allows both 32- and 64-bit data transfers).
- Console and diagnostic firmware (512-KB of flash-erasable read only memory—FEPROM).
- 8-KB of EEROM for console use.
- Time-of-year (TOY) clock, based on Dallas Semiconductor DS1287.

- One asynchronous serial line unit (SLU) dedicated to the console subsystem.
- One additional asynchronous SLU with modem control.
- Serial control bus controller for communications with other components of the system.

I/O Daughter Board

Each system has an I/O daughter board that allows the system to access mass storage and backup resources via five ports:

- Four SCSI-2/DSSI buses for external fixed-media devices, each supporting up to seven external devices.
- One SCSI-2 bus for internal removable-media and fixed-media devices, limited expansion for up to three external devices.

Serial Control Bus

The serial control bus is a two-conductor serial interconnect bus that is independent of the system bus. The serial control bus connects the following modules:

- CPUs
- I/O module
- Memory modules
- Power system controller (PSC)
- Operator control panel (OCP)

The serial control bus is used by the system to communicate with the main interfaces on the OCP and power system controller, and with the 256 x 8 error log EEPROM devices on the CPU, I/O, and memory modules.

The serial control bus is also used by the system for maintenance and control functions, such as power-up and power-down sequencing, error-logging, and error-reporting.

Power Subsystem

Components

The power subsystem is a universal supply that automatically selects the correct operational voltage range. Some elements of the supply are distributed, others are centralized and modular. Power for the backplanes is provided by the centralized power source. Internal storage devices are powered by a dc-dc converter (local disk converter) included in the bottom tray.

The power subsystem has five basic components:

- Front end unit (ac to 48 V dc with power factor correction)
- Power system controller
- DC-DC converter unit—5 V at 150 A.
- DC-DC converter unit—This unit generates three voltages: 12 V at 4 A, 3.3 V at 20 A, and 2.1 V at 10 A (Futurebus+ terminator power).
- Local disk converters. The local disk converters generate three voltages for storage devices (+5, +12, and +5 V SCSI-2/DSSI terminator voltage).

All of the power supply components (except the local disk converter) plug into and mount in a card cage attached to the system backplane. The local disk converter is mounted in the bottom tray.

You can enhance system availability with an optional external uninterruptible power supply (UPS). A UPS is able to keep the system running in the event of a power failure.

Uninterruptible Power Supply (Optional)

You can connect an optional uninterruptible power supply to your system. Connecting an uninterruptible power supply (UPS) to the DEC 4000 AXP Rackmount system can keep the system running for approximately 30 minutes after a power failure.

For information about ordering a UPS for your system, refer to the *Systems and Options Catalog*.

Storage Subsystem

Components

Each system has a storage subsystem, which consists of an internal mass storage compartment and, optionally, external devices.

Mass Storage Adapters

Your system has five adapters built into the I/O module. The adapters provide a path to each mass storage bus through which the CPU can communicate with mass storage devices.

Each of the five adapters can support up to eight nodes. The adapter and each device count as one node; hence, each adapter can support seven storage devices.

DSSI adapters allow you to link one system to another to form a DSSI VMScluster configuration. When a DSSI bus is extended to a second system, both systems can share up to six DSSI storage devices.

Mass Storage Devices

Mass storage devices record data on media. Use mass storage devices to store data and software permanently. When the data or software is needed, the CPU copies it from the mass storage device into main memory. The two primary types of mass storage devices are fixed-media devices, such as fixed-disk drives and removable-media devices, such as tape cartridges and compact discs.

Mass Storage Expansion

You can expand mass storage capacity on a DEC 4000 AXP Rackmount system by rackmounting extra drives within the same or another enclosure.

Futurebus+ Subsystem

Overview

DEC 4000 AXP Rackmount systems implement Futurebus+ Profile B as the I/O bus. Features of Futurebus+ include:

- Industry open standard bus.
- 32- or 64-bit, multiplexed address and data bus.
- Asynchronous protocol.
- Centralized arbitration.
- 160 MB/s bandwidth, asymptotic/100 MB/s sustained.

Six Futurebus+ modules can reside in the Futurebus+ portion of the card cage. The slots are numbered 1–6, from right to left.

References

The following table describes additional sources of information about your system.

Task	Document
Understand system unit internals	*DEC 4000 Model 600 Series Technical Manual*
Understand mass storage devices	Device-specific owner's guide
Order a UPS	*Systems and Options Catalog*

10

Care, Maintenance, and Exterior Customizations

Chapter Description

Introduction

This chapter focuses on the care and maintenance of your system as well as the customizations that you can make to the system's exterior.

In This Chapter

This chapter covers the following information:

- Customizing the System Unit
- Maintaining the System

Customizing the System Unit

Overview

You can customize the system unit in the following ways:

- Label the system name
- Replace English-language labels
- Change the baud rate

Locate Accessories

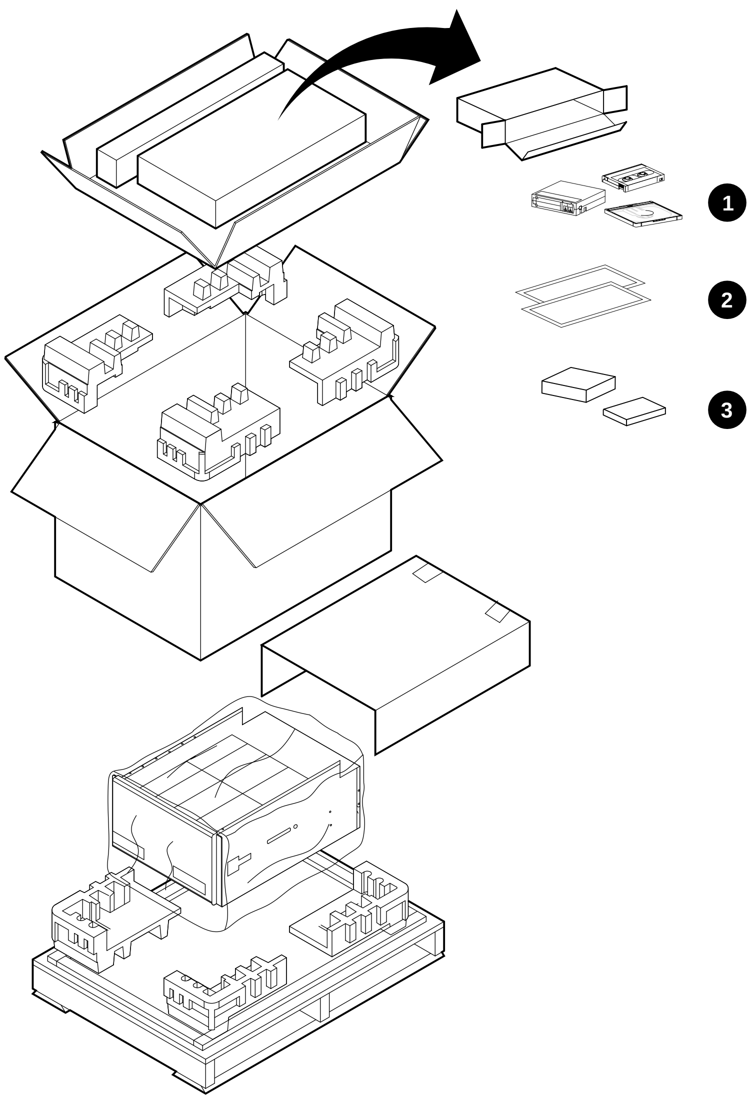
Locate the accessories box in the system shipping carton. (Figure 10–1).

❶ Blank media

❷ Logical ID label

❸ Tape cleaning kits

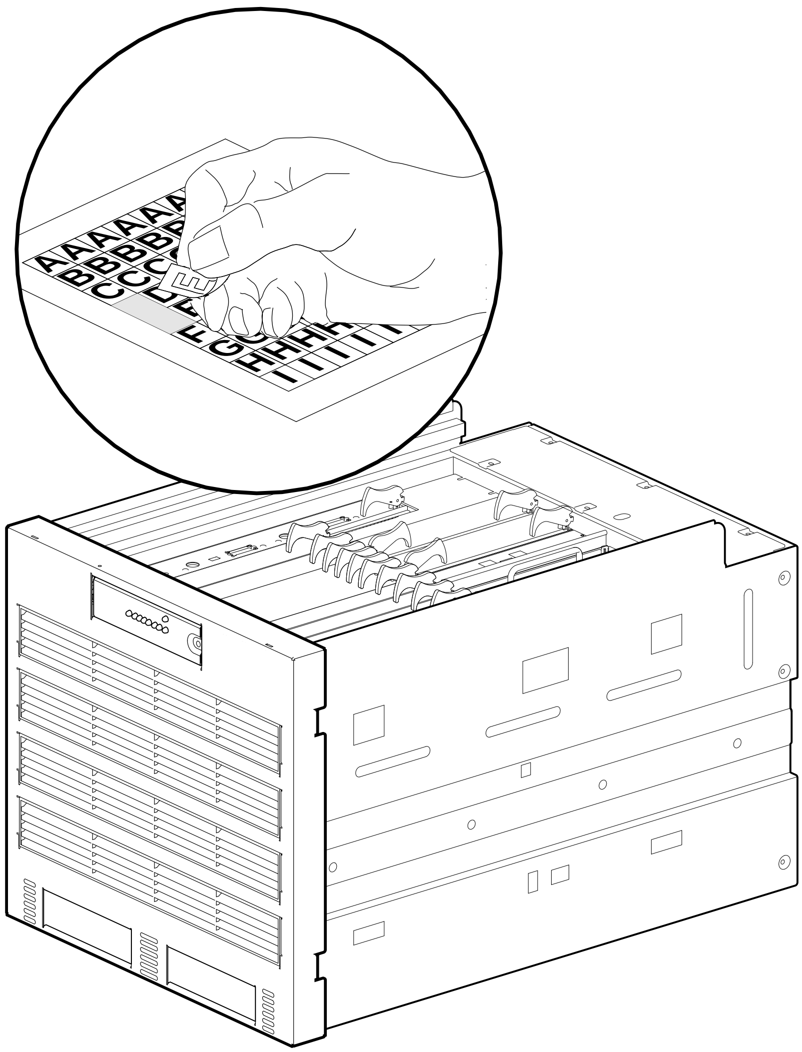
Figure 10–1 Accessories Box



Label the System Name

Your operating system software instructs you in how to name your system. You can add the system name (network node name) in a convenient location on the system using the logical node name label letter card from the accessories box as shown in Figure 10–2.

Figure 10–2 Labeling the System Name



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Replace English-Language Labels

If you wish, place labels written in an alternate language on top of the English-language labels, using the language set of your choice from the sets of language labels in the accessories box.

Antistatic Wrist Strap

An antistatic wrist strap, labeled Disposable Grounding Wrist Strap, is included in the system accessories box. Use of this strap is required when you are performing system maintenance and handling static-sensitive modules. If you are not performing system maintenance, it is not necessary to use this strap.

For information about how to use the strap, refer to the Disposable Grounding Wrist Strap envelope.

Changing the Baud Rate

The system's baud rate is set at the factory to 9600. Change the console terminal port baud rate by following the instructions in this section.

Note

To change the baud rate of the console terminal port temporarily, you can change the setting of the tta0_baud environment variable. (See Changing the Baud Rate (tta0_baud and tta1_baud) in Chapter 6.) The baud rate switch setting (described in this section) overrides the tta0_baud setting when you cycle power on the system.

Change the baud rate as follows:

Note

The switch is only accessable by removing the front bezel and extending the chassis on its rails.

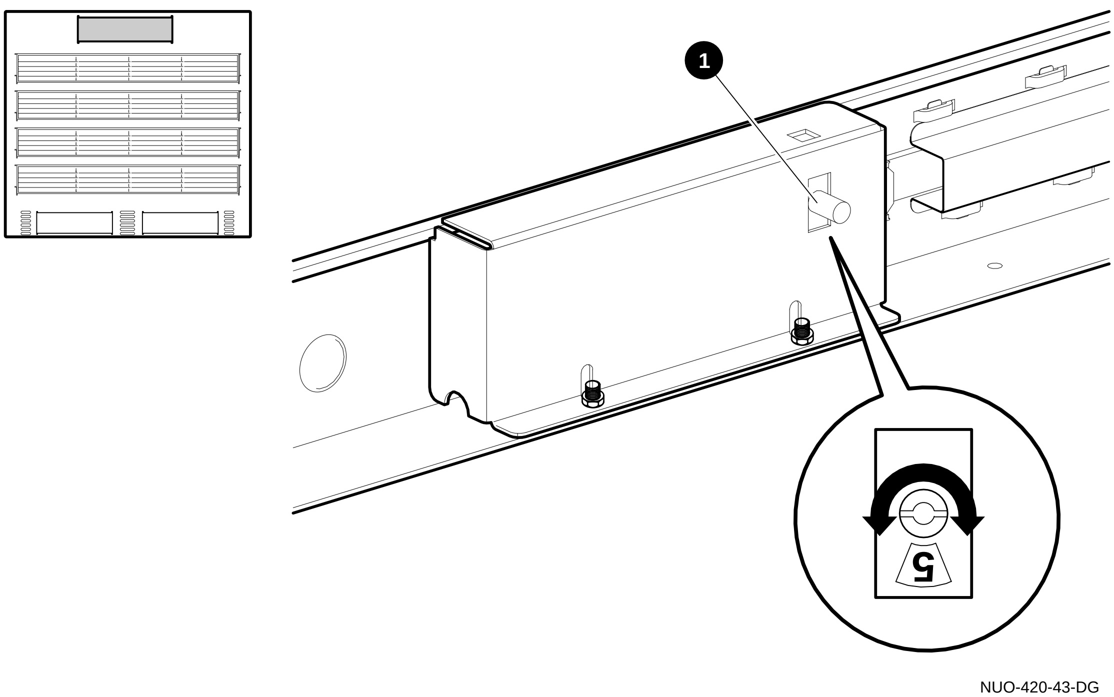
1. On the back of the operator control panel, the number in the view window (5 in Figure 10–3) signifies the current baud rate setting. The numbers and the baud rate they represent are as follows:

View Window Number	Baud Rate Equivalent
1	600
2	1200
3	2400
4	4800
5	9600
6	19,200

2. On the back of the panel, turn the black plastic screw (❶ in Figure 10–3) to the number that represents the setting you desire.

3. Restore the chassis to the cabinet and reinstall the bezel.

Figure 10–3 Location of the Baud Rate Switch



Maintaining the System

Overview

While your DEC 4000 AXP Rackmount is designed to function in a range of environmental conditions, it should be treated with care and maintained properly.

Correct use and maintenance of your system, monitor, and keyboard not only assures that the system functions properly, but also helps avoid more serious problems that could cause permanant damage and corrupt your files.

Environmental Guidelines

Apart from performing maintenance tasks, you should be operating your system within the guidelines described in the *DEC 4000 Model 600 Series Site Preparation Checklist*. Refer to the card for a description of the range of acceptable environmental conditions for your system.

The DEC 4000 AXP Rackmount system unit requires adequate ventilation. Ideally, the system unit should be positioned in a dust-free environment. Also, never position the system unit in direct sunlight where it may become too hot.

Clean your system regularly by wiping dust and particles from the system unit and the keyboard with a soft cloth.

Liquid on the System Unit

If you inadvertently spill liquid on the system unit and it seeps inside, turn off the system and contact your Digital Services representative.

11

Troubleshooting the System

Chapter Description

Introduction

Troubleshooting generally means encountering and resolving a system problem that is preventing you from using your system to perform normal operations.

Though your DEC 4000 AXP Rackmount system is a high-quality, thoroughly tested product, it is also an electrical device that may exhibit problems on occasion. If you are experiencing problems with your system, this chapter will help you identify and fix the problem.

In This Chapter

This chapter covers the following information:

- Before You Begin
- Task Overview
- Determining Type of Problem
- Power Problems
- Problems Getting to Console Mode
- Console Mode Problems
- Boot Problems
- Operating System Problems
- Mass Storage Problems
- Network Problems
- Reporting Problems to Digital Services

Before You Begin

Two Ways to Solve System Problems

There are two ways to solve problems with the DEC 4000 AXP Rackmount system:

1. Use the information in this chapter to help identify and fix the problem yourself.
2. Contact your Digital service representative to diagnose and fix the problem for you.

Method to Identify Problems

Table 11–1 lists ways to identify problems, and indicates where each method is described:

Table 11–1 How to Identify a Problem

To identify a problem this way . . .	Refer to . . .
Using the troubleshooting tables	This chapter
Running diagnostic tests	`test` command (test) in Chapter 5

Using the troubleshooting tables in this chapter is the easiest and most direct approach to identifying and correcting a problem with your DEC 4000 AXP Rackmount system. Therefore, this is the method you should begin with if you are experiencing problems.

Task Overview

Steps to Identifying a Problem

Table 11–2 describes the steps required to identify and fix system problems.

Table 11–2 Steps to Resolving Problems

Step	Description
1.	Determine type of problem.
2.	Locate problem in troubleshooting tables.
3.	Follow suggested actions to resolve problem.
4.	If necessary, run diagnostic tests.
5.	Contact Digital service representative.

The next sections describe these steps.

Determining Type of Problem

Types of System Problems

Determine the type of problem that your system is experiencing from the list in Table 11–3.

Table 11–3 Type of Problem

For this kind of problem . . .	See this section . . .
Power	Power Problems
Getting to console mode	Problems Getting to Console Mode
Console mode	Console Mode Problems
Boot	Boot Problems
Operating system	Operating System Problems
Drive access	Mass Storage Problems
Network	Network Problems

If you cannot locate the problem your system is experiencing, or if the corrective actions in the troubleshooting tables do not resolve the problem, see the Reporting Problems to Digital Services section, later in this chapter.

Power Problems

Power Problems

This section describes how to troubleshoot the system when there is no power at the system enclosure or the power supply subsystem lights indicate power trouble.

Table 11–4 describes possible power problems and their solutions. The next section, Power Supply Lights, explains how to interpret the lights.

Table 11–4 Diagnostic Flow for Power Problems

Symptom	Action	Reference
No ac power at system. AC present light is off.	Check the power source and power cord.	
AC power is present, but system does not power on.	Check the ac circuit breaker setting.	
	Examine power supply subsystem lights to determine if a power supply unit or fan has failed, or if the system has shut down due to an overtemperature condition.	Figure 11–1, Table 11–5

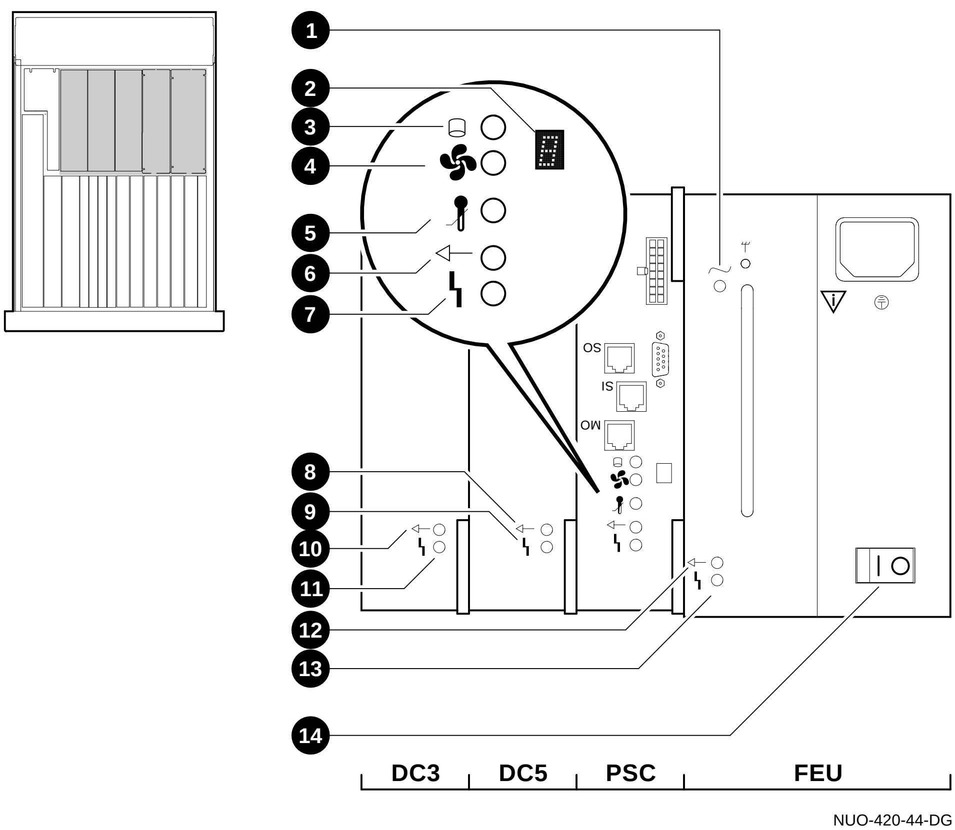
Power Supply Lights

The power supply lights on the top of the system (Figure 11–1) are used to indicate the status of the components that make up the power supply subsystem. Refer to Table 11–5 for information on interpreting the lights and determining what actions to take when a failure is indicated.

Note

The chassis must be extended on its rails for the power supply lights/indicators to be visible.

Figure 11–1 Power Supply Lights



❶ AC present indicator
❷ Fault ID display
❸ Disk power failure indicator
❹ Fan failure indicator
❺ Overtemperature shutdown indicator
❻ PSC OK indicator
❼ PSC failure indicator
❽ DC5 OK indicator
❾ DC5 failure indicator
❿ DC3 OK indicator
⓫ DC3 failure indicator
⓬ FEU OK indicator
⓭ FEU failure indicator
⓮ AC circuit breaker

Table 11–5 Interpreting Power Supply Lights

Light	Meaning	Action on Error
Front End Unit (FEU)		
AC Present	When on, indicates ac power is present at the ac input connector (regardless of circuit breaker position).	If ac power is not present, check the power source and power cord. If the system will not power up and the ac light is the only light that is on, check the ac circuit breaker.
FEU OK	When on, indicates dc output voltages for the FEU are above the specified minimum.	
FEU Failure	When on, indicates dc output voltages for the FEU are less than the specified minimum.	Call Digital Services.
Power System Controller (PSC)		
PSC OK	When blinking, indicates the PSC is performing power-up self-tests. When steady, indicates the PSC is functioning normally.	
PSC Failure	When on, indicates the PSC has detected a fault in itself.	Call Digital Services.
Disk Power Failure	When on, indicates the local disk converter has failed. The number "3" is displayed in the hexadecimal fault ID display.[1]	Call Digital Services.
Fan Failure	When on, indicates a fan has failed. The failing fan is identified by a number displayed in the hexadecimal fault ID display.	Call Digital Services.

[1] The Rackmount DEC 4000 only supports one (1) Local Disk Converter (LDC). Any code other than "3" displayed in the Fault ID display, in conjunction with a "DISK POWER FAILURE" indication, is not applicable to the Rackmount DEC 4000 Model 600.

(continued on next page)

Table 11–5 (Cont.) Interpreting Power Supply Lights

Light	Meaning	Action on Error
Power System Controller (PSC)		
Overtemperature Shutdown	When on, indicates the PSC has shut down the system due to excessive internal temperature.	Set the dc On/Off switch to off (0). Examine the air plenum at the top of the system and the air exhaust ports at the bottom sides of the system, making sure they are not blocked. Power up the system when you have removed ventilation blocks. Wait at least one minute before turning on the system.
DC-DC Converter (DC3)		
DC3 OK	When on, indicates that all of the output voltages are within specified tolerances.	
DC3 Failure	When on, indicates that one of the output voltages is outside specified tolerances.	Call Digital Services.
DC-DC Converter (DC5)		
DC5 OK	When on, indicates the 5 V output voltage is within specified tolerances.	
DC5 Failure	When on, indicates the 5 V output voltage is outside specified tolerances.	Call Digital Services.

Problems Getting to Console Mode

Pre-Console Mode Problems

This section describes how to troubleshoot the system when you power up the system, but the console terminal does not display on the power-up screen.

- Table 11–6 describes possible problems when getting to console mode and their solutions.
- Table 11–7 explains how to interpret the lights on the operator control panel.

Table 11–6 Diagnostic Flow for Problems Getting to Console

Symptom	Action	Reference
Power-up screens are not displayed on console terminal.	Check terminal power source and power cord.	
	Check terminal brightness and contrast controls. Verify that the terminal power switch is on.	
	Check system operator control panel lights for a failure during self-tests. If two operator control panel lights remain on, either option could be at fault.	Figure 11–2 and Table 11–7
	Make sure that baud rate settings for terminal and system match. The system default baud rate setting is 9600.	Changing the Baud Rate in Chapter 10
	Try connecting the console terminal to the auxiliary serial port.	

Operator Control Panel Lights

The operator control panel lights (Figure 11–2) are used to indicate the progress and result of self-tests for Futurebus+, memory, CPU, and I/O modules. Refer to Table 11–7 for information on interpreting the lights and determining what actions to take when a failure is indicated.

❶ DC power light

❷ Self-test status lights

Figure 11–2 Operator Control Panel Lights

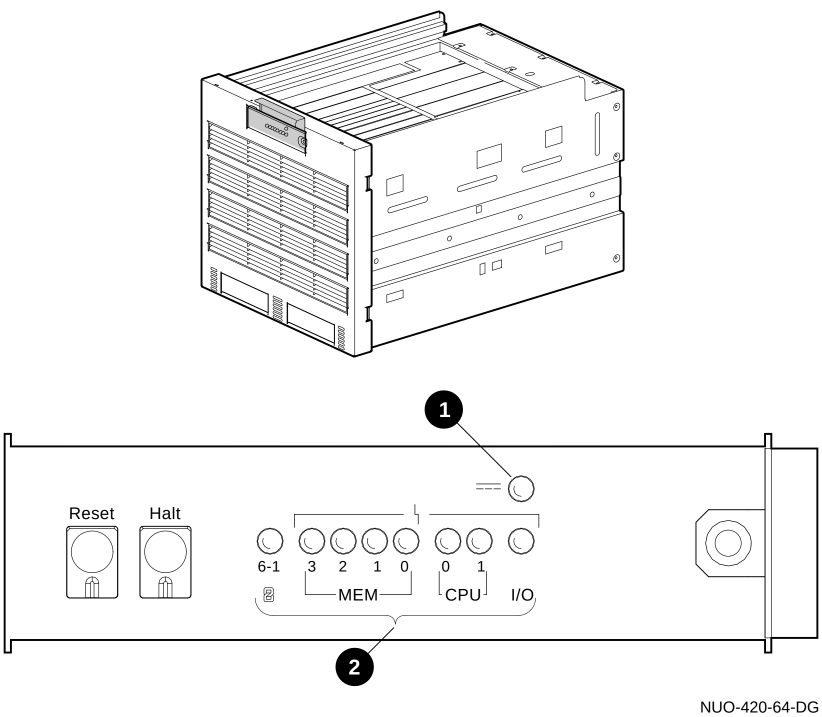


Table 11–7 Interpreting Operator Control Panel Lights

Light	Meaning	Action on Error
6–1	Remains on if a Futurebus+ option has failed self-tests.	Call Digital Services.
MEM 3, 2, 1, 0	Remains on if a memory module has failed self-tests.	Call Digital Services.
CPU 0, 1	Remains on if a CPU module has failed self-tests.	Call Digital Services.
I/O	Remains on if the I/O module has failed self-tests.	Call Digital Services.
DC Power	When on, indicates that dc power is present.	
	When not on, indicates that dc power is not present.	If the ac circuit breaker is set to ON (|), reset the system and examine the power supply lights. If the problem persists, call Digital Services.

Console Mode Problems

Console Mode Problems

This section describes how to troubleshoot your system when self-tests do not complete or when error messages are displayed on your console terminal in console mode.

Table 11–8 describes problems reported by the console and their solutions.

Table 11–8 Diagnostic Flow for Console Mode Problems

Symptom	Action	Reference
Power-up screens are displayed, but tests do not complete.	Use power-up display and/or operator control panel lights to determine error.	Figure 11–2, Table 11–7, Figure 3–1, and Figure 3–2 (in Chapter 3)
Console error message appears.	Call Digital Services.	

Boot Problems

Boot Problems

This section describes how to troubleshoot problems that occur while the system is booting operating system software.

Table 11–9 describes possible problems during booting and their solutions.

Table 11–9 Diagnostic Flow for Boot Problems

Symptom	Action	Reference
System cannot find boot device.	Check the default boot device and boot flag settings.	Setting or Changing the Default Boot Device (bootdef_dev) and Setting Boot Flags (boot_osflags) in Chapter 6.
	Check system configuration for correct device parameters (drive ID, device name, and so on) by entering `show device` command.	Displaying System Configuration , Changing Drive ID Numbers (External Media) and Setting and Examining Parameters for DSSI Devices in Chapter 8.
Device does not boot.	Run the `test` command to check that boot device is healthy.	The `test` command (test in Chapter 5). If device is not operating, call Digital Services.
	Boot the system interactively or using a diagnostic bootstrap.	Setting Boot Flags (boot_osflags) in Chapter 6.

Operating System Problems

Operating System Problems

This section desribes how to troubleshoot system problems that occur while operating system software is up and running.

Table 11–10 describes possible operating system problems and their solutions.

Table 11–10 Diagnostic Flow for Operating System Errors

Symptom	Action
System halts; >>> displayed on console terminal.	Check to see whether the system was accidentally halted by entering the `continue` command and pressing Return. If the system resumes program execution, the system was accidentally halted.
	Record screen display error messages and call Digital Services.
System reboots unexpectedly.	Let rebooting complete.
	Record screen display error messages and call Digital Services.

Mass Storage Problems

Mass Storage Problems

This section describes how to troubleshoot mass storage-related problems. Typically, these problems occur while operating system software is up and running.

Table 11–11 describes possible drive problems and their solutions.

Note

The bottom tray must be lowered to see the hard drive fault lights.

Table 11–11 Diagnostic Flow for Mass Storage Problems

Symptom	Action	Reference
Write error message displayed or unable to copy to media.	Check that media is not write-protected.	
Drive fault light comes on or blinks.	Check that drive ID is correct. Correct drive ID plug if it is incorrect.	
	Make sure all devices and controllers or adapters on same bus have unique drive IDs.	Changing Drive ID Numbers (External Media) in Chapter 8.
	Abnormal environmental condition. Reset temperature or humidity to normal condition.	
	If fault light stops blinking, system may have corrected itself. If fault light remains on, call your Digital service representative.	

(continued on next page)

Table 11–11 (Cont.) Diagnostic Flow for Mass Storage Problems

Symptom	Action	Reference
	Check that bus is properly terminated.	Terminating and Extending a DSSI Bus in Chapter 8.
Read error message displayed.	Wait for drive to spin up. Continue entering `show device` command until device is displayed in list of devices. If device is not displayed, call your Digital service representative.	
	Perform corrective actions listed if drive fault light comes on or blinks.	

RRD42 Disc Caddy Removal Problem

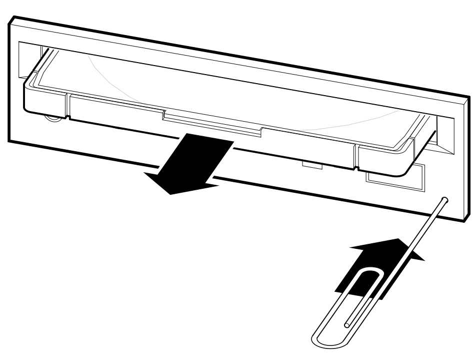
If you are unable to eject a disc caddy using the drive eject button, the Eject button may be disabled by software. Table 11–12 describes how to manually remove the caddy. Table 11–11 describes how to troubleshoot all other RRD42 problems.

Manually remove the disc caddy as follows:

Table 11–12 Manual Removal of a Disc Caddy

Step	Action
1	Shut down the system.
2	Set the ac circuit breaker to the OFF position (0).
3	Insert the end of a steel rod the size of a large paper clip into the manual eject hole, as shown in Figure 11–3, and push until the disc emerges from the drive.

Figure 11–3 Manually Removing a Disc Caddy



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Network Problems

Ethernet Problems

If an error message displays when verifying or testing the Ethernet connection, see Table 11–13.

Table 11–13 Resolving Ethernet Problems

Symptom	Action
Ethernet error message is displayed.	Check to see if an Ethernet cable was removed. If so, replace the cable with a terminator.
	Check that all connections on the Ethernet segment are secure.
	Check that Ethernet switch on the rear of the system is in proper position for the port (either thickwire or ThinWire) that you are using.

Reporting Problems to Digital Services

Digital Support Centers

Digital service representatives are available at Digital support centers for customers who have on-site warranty and service contracts. If you wish to purchase a service contract, contact either a Digital support center listed in Table 11–14, or your local Digital office.

How to Report Problems

If you are unable to locate the system problem in the previous sections of this chapter, or the actions suggested could not resolve the problem, contact your Digital service representative. Before calling to report a problem, complete these steps.

1. Locate the part and serial numbers, printed on the label at the rear of your system. Record these numbers on a copy of the Problem Worksheet at the end of this chapter.

   Your Digital service representative will need this information when you call.

2. Fill in the “Status of the System” information on the worksheet.

3. Note the problem, possible causes if you know them, and solutions suggested in the previous sections. Also indicate what actions (if any) you have already taken to try to correct the problem.

4. Be prepared to read information from the screen and to enter commands at the keyboard while you talk to your Digital service representative.

Digital Support Center Contact Numbers

Table 11–14 lists the telephone numbers for contacting a Digital service representative at your Digital support center.

If your Digital Services number is not listed in Table 11–14, contact your local Digital office for assistance.

Table 11–14 Telephone Numbers of Digital Support Centers

Country	Telephone Number
United States	1-800-354-9000
Canada	1-800-267-5251
Canada (Quebec)	1-800-267-2603
United Kingdom	[44]256 59200
France	[33]92955111
Germany	[49]-(89)-95913218

References

The following table describes where to find additional troubleshooting information.

Task	Document
Power up, put on line, install terminal cable, reset setup, or set terminal baud rate of the console terminal	Terminal installation guide
Look up appropriate temperature range for system environment	Appendix A
Diagnostics, troubleshooting, error log analysis, system integration	*DEC 4000 AXP Model 600 Series Service Guide*

12

Removal and Installation Procedures

Chapter Description

Introduction

Warning

The information in this chapter is for use by Digital customer service personnel and qualified self-maintenance customers.

This chapter describes how to remove and install the recommended spare parts (also referred to as field replaceable units (FRUs)). For troubleshooting information, refer to Chapter 11.

Warning

Whenever performing any removal or installation procedure, ensure that the ac circuit breaker located at the top of the DEC 4000 AXP Rackmount system is in the OFF position and the power cord is disconnected from the ac power source.

The system weighs 65.7 kg (146 lbs). Ensure that the enclosure is stabilized before the system is extended on its slides.

Chapter Description

In This Chapter

This chapter provides information concerning the following:

- FRU Location
- Accessing Top FRUs
- Accessing Bottom FRUs
- Bottom Tray, Removal/Installation
- Modules, Removal/Installation
- OCP, Removal/Installation
- I/O Daughter Board Assembly, Removal/Installation
- LDC Board, Removal/Installation
- Fan, Removal/Installation
- Disk Drives, Removal/Installation
- Fingerstock, Removal/Installation
- SCSI to DSSI Adapters, Removal/Installation
- Back Plane Assembly, Removal/Installation

FRU Location

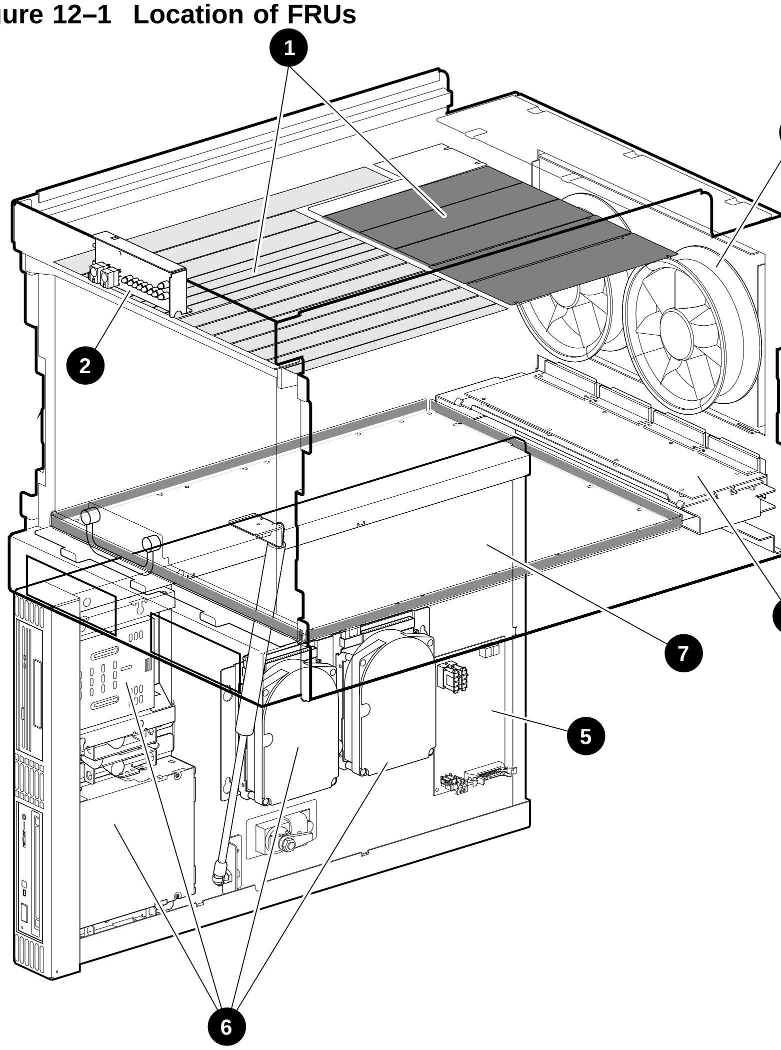
This chapter covers the removal and installation of the FRUs listed in Table 12–1. Figure 12–1 shows the location of those FRUs in the DEC 4000 AXP Rackmount system. For a complete list of part numbers of all recommended spares and other FRUs, refer to Appendix B.

Depending on where the FRU is located, you may need to pull the system out of the rack to gain access to the FRUs in the top of the system. You may also need to lower the bottom tray to access FRUs in the tray or access cable connections to FRUs at the rear of the system.

Table 12–1 Recommended Spares

Item	Part Number
OCP Module	54-22569-01
I/O Daughter Board	54-21779-01
LDC Power Board	54-20868-01
Fan	12-36202-01
Disk Drives	See Chapter 7 for list
Bottom Tray Fingerstock	See Appendix B for list
SCSI to DSSI Adapters	12-39838-01
Back Plane Assembly	70-30518-01

Figure 12–1 Location of FRUs



❶ Modules
❷ Operator Control Panel (OCP)
❸ Fans
❹ Input/Output (I/O) board
❺ Local Disk Converter (LDC) board
❻ Media drives
❼ Backplane

Accessing Top FRUs

Extending Chassis For Service

To access the top FRUs, you need to remove the front bezel and pull out the system on its slides. To do this, refer to Figure 12–2 and proceed as follows:

1. Remove the front bezel by inserting a flat blade screwdriver into the top, left slot ❶ of the bezel ❷, and then push toward the system to release the top, left side of the bezel from the ball stud ❸ on the chassis.
2. Repeat the procedure using the right slot ❹ to release the top, right side of the bezel.
3. Pull the bezel away from the system.
4. Remove the four system retaining screws ❺ fastening the front of the system to the rails.
5. Stabilize the enclosure. For example, pull out the cabinet stabilizer foot ❶ as shown in Figure 12–3. The stabilizing feature may be different depending on your cabinet.

Warning

The system weighs 65.7 kg (146 lbs). Ensure the enclosure is stabilized before the system is extended on its slides.

6. Using the system handle ❷, pull the system out of the rack on its slides. You can now access the FRUs in the top of the system.

Note

If you intend to open the bottom tray, pull the system out to the full travel of the slides to the point where the two slide locks are locked.

Figure 12–2 Removing the Front Bezel

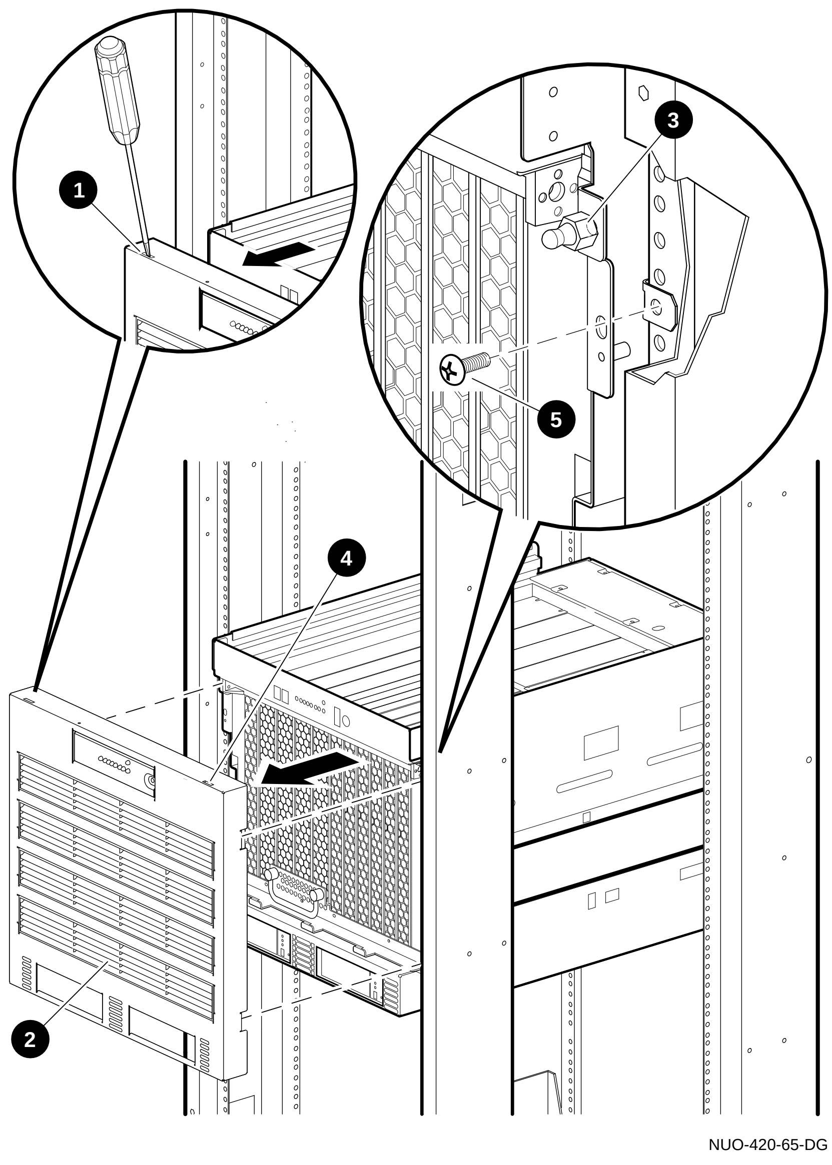
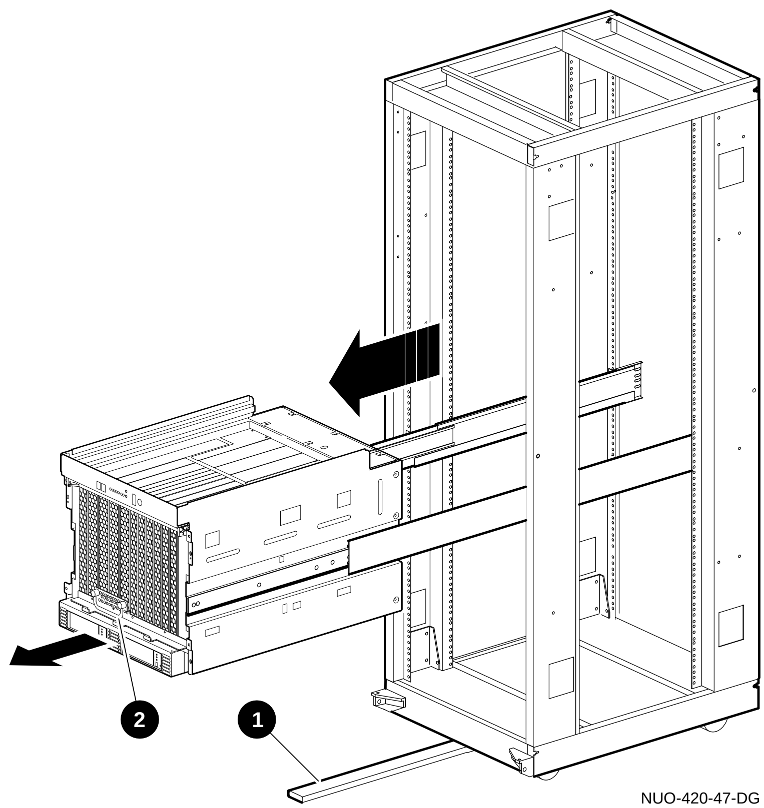


Figure 12–3 Pulling Out the System



Warning

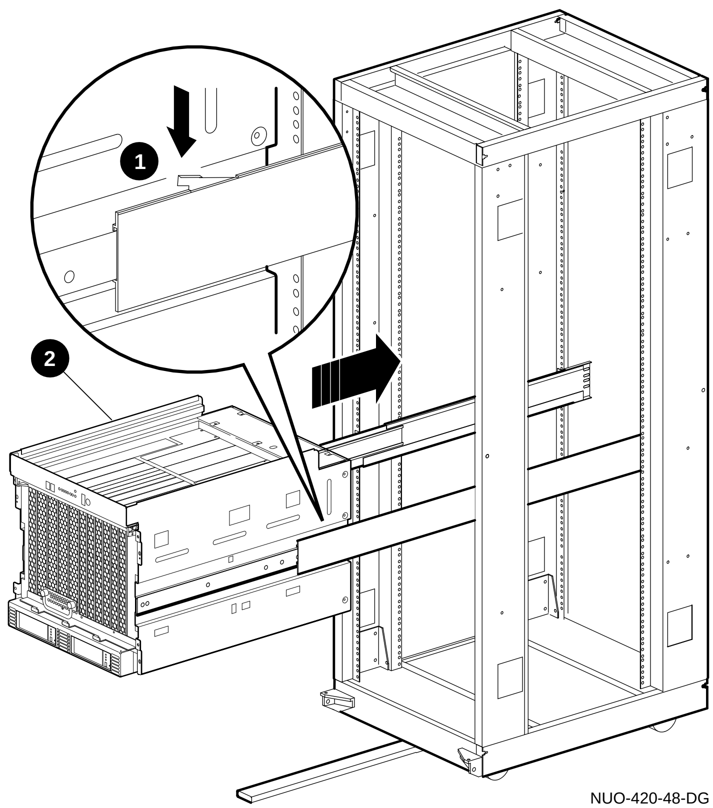
The system weighs 65.7 kg (146 lbs). Ensure the enclosure is stabilized before the system is extended on its slides.

Placing the System Back into the Rack

To place the system back into the rack, refer to Figure 12–4 and proceed as follows:

1. If the system ❷ was pulled out all the way, push down on the two slide locks ❶ before pushing the system back into the rack.
2. Refer to Figure 12–2 and install the four system retaining screws ❺ and tighten.
3. Install the bezel ❷ by aligning it with the four ball studs ❸ and pushing it into place.

Figure 12–4 Placing System Back Into the Rack



Accessing Bottom FRUs

Opening the Bottom Tray

To gain access to the FRUs in the bottom of the system or to the cable connections of the I/O daughter board at the rear of the system, you need to pull the system out of the cabinet and lower the bottom tray.

To gain access to the FRUs, refer to Figure 12–5 and proceed as follows:

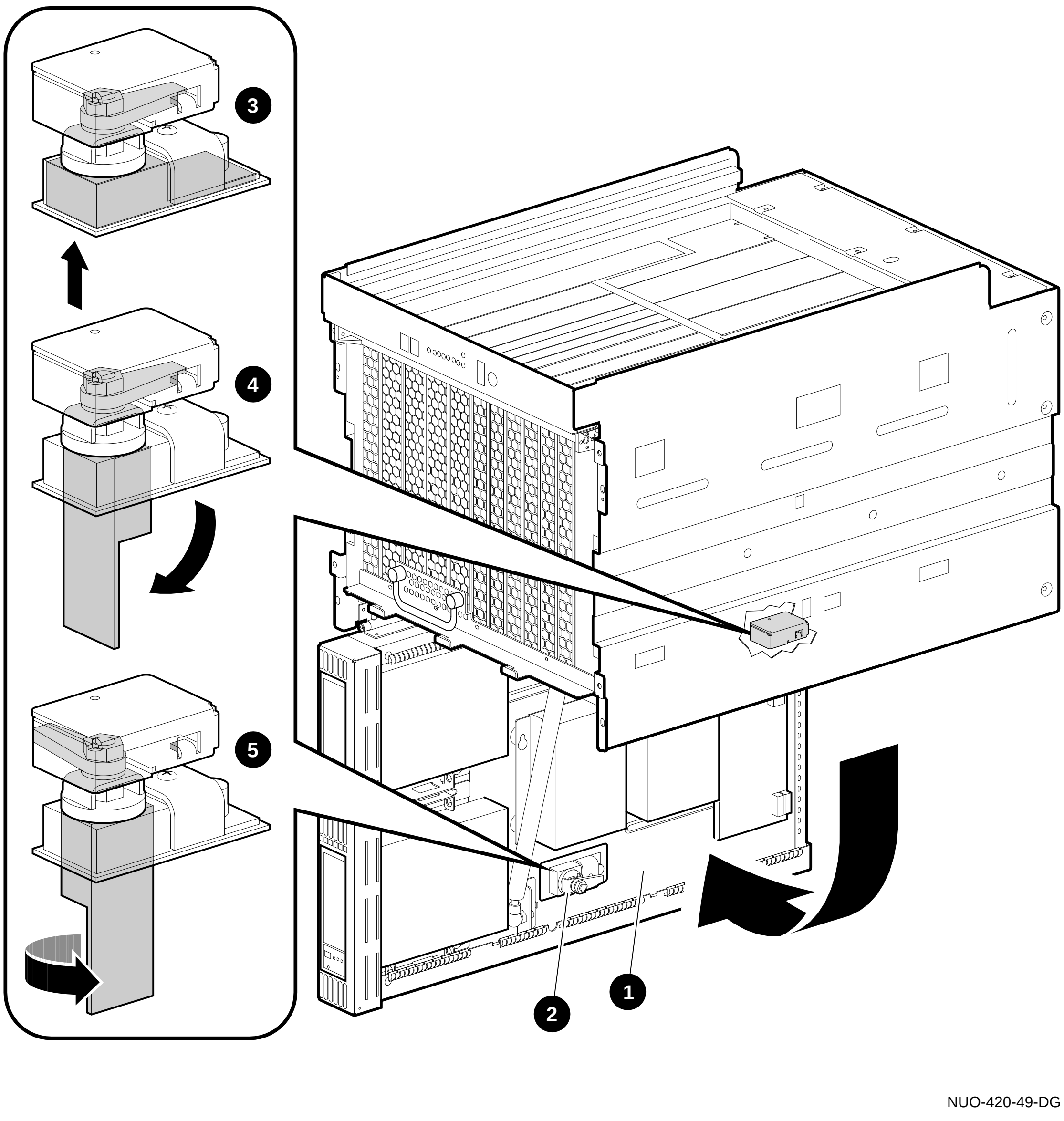
1. Pull the system out of the rack using the procedure in Extending Chassis For Service.

Warning

There is an energy hazard near the LDC board. Make sure the system is shut down before opening the bottom tray.

2. While holding up the bottom tray ❶ with one hand, release the latch ❷ by pushing in on one end ❸ of the latch to make the latch handle accessible. Then pull down ❹ and turn the handle clockwise ❺ to release the bottom tray.
3. Allow the bottom tray to lower to its vertical position. This provides access to the FRUs in the bottom tray and cable connections to the I/O daughter board at the rear of the system.

Figure 12–5 Opening the Bottom Tray



Closing the Bottom Tray

Caution

Before closing the bottom tray, ensure that all cables are properly positioned so that none are pinched when closing the bottom tray.

To close the bottom tray and place the system back into the rack, refer to Figure 12–5 and proceed as follows:

1. Push the bottom tray ❶ back up into the system chassis and hold with one hand.
2. Turn the latch handle ❷ counterclockwise to secure the tray and then push the handle back into its resting place.
3. Place the system back into the rack by following the instructions in Placing the System Back into the Rack.

Bottom Tray, Removal/Installation

Bottom Tray, Removal

There may be times when it is necessary, or more convenient, to work on the system with the bottom tray removed.

Warning

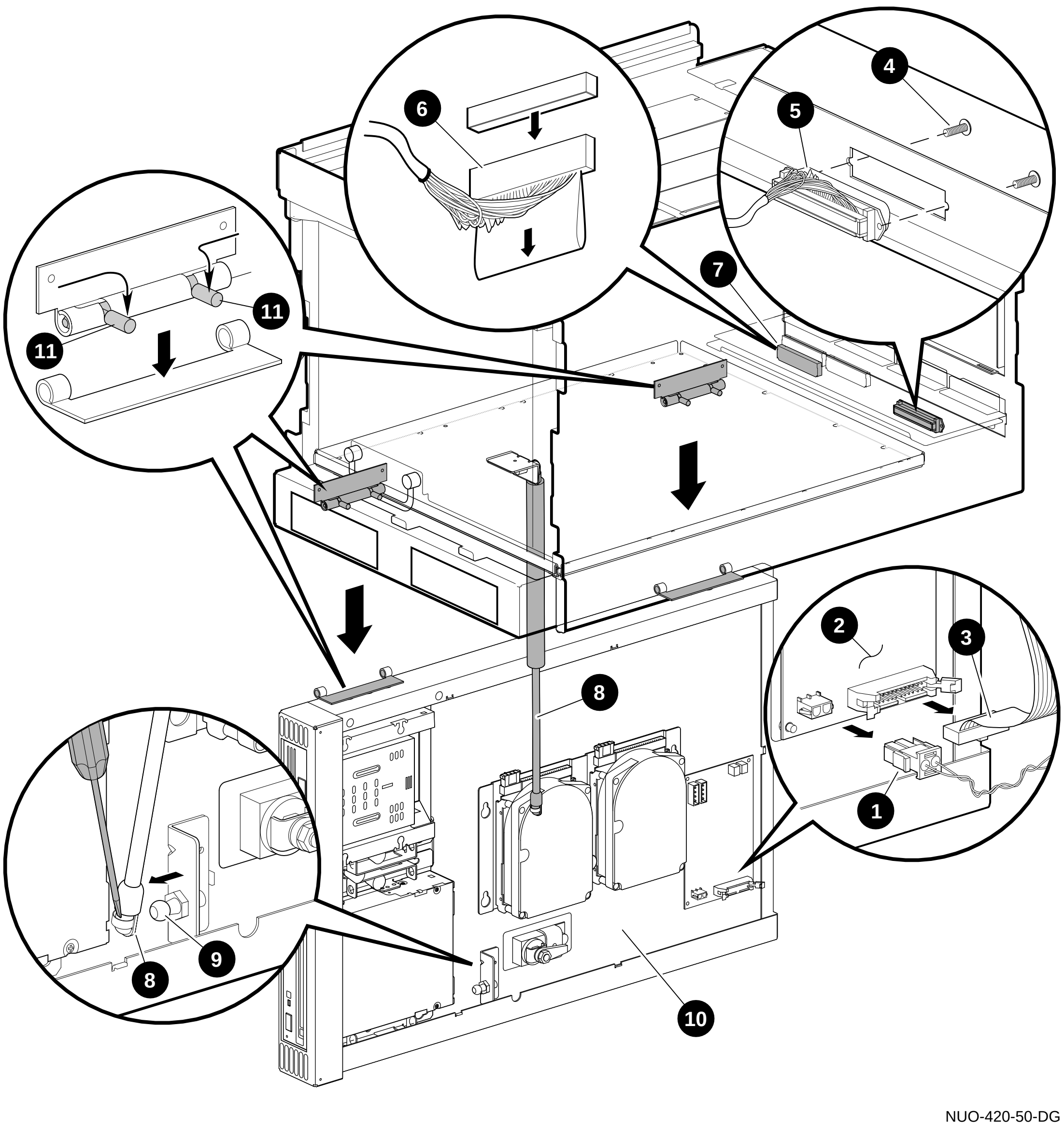
The bottom tray weighs approximately 25 pounds, and it is awkward to handle. To prevent injury or damage to the equipment, it is recommended that at least two people be involved in removing or installing the bottom tray.

To remove the bottom tray, refer to Figure 12–6 and proceed as follows:

1. Pull the system out of the rack and open the bottom tray as described in Opening the Bottom Tray.
2. Disconnect the black/purple twisted-pair cable ❶ from the LDC board ❷.
3. Disconnect the I/O cable (flat cable) ❸ from the LDC board ❷.
4. From the rear of the unit, remove one retaining screw ❹ from the SCSI connector ❺.
5. Loosen the other retaining screw and remove the SCSI connector. This cable comes from the fixed-media drive.
6. Disconnect the white SCSI cable ❻ from the I/O daughter board ❼. This cable comes from the removable-media drive.

7. Disconnect the end of the gas strut ❽ attached to the ball stud ❾ in the bottom tray ❿. This is done by inserting a flat blade screwdriver as shown in Figure 12–6. Twist the screwdriver to release the gas strut from the ball stud. Then pull the gas strut away from the ball stud.
8. While one person holds the bottom tray ❿ in place (open position), squeeze the two hinge pins ⓫ on each hinge as shown in Figure 12–6 into the locked position.
9. Separate and remove the bottom tray ❿ from the hinges and the system.

Figure 12–6 Removing the Bottom Tray



Bottom Tray, Installation

To install the bottom tray, refer to Figure 12–6 and proceed as follows:

Warning

The bottom tray weighs approximately 25 pounds, and it is awkward to handle. To prevent injury or damage to the equipment, it is recommended that at least two people be involved in removing or installing the bottom tray.

1. Position the bottom tray ❿ vertically and up into the system.
2. Squeeze the hinge pins ⓫ of the bottom tray into the locked position.
3. Align the hinges on the bottom tray with the chassis hinges, and then release the hinge pins ⓫, allowing them to snap into place.
4. Push the end of the gas strut ❽ onto the ball stud ❾ in the bottom tray ❿.
5. Connect the white SCSI cable ❻ from the removable-media drive to the I/O daughter board ❼.
6. Attach the white SCSI cable ❺ from the fixed-media drive to the rear of the unit using two screws ❹.
7. Connect the I/O cable (flat cable) ❸ to the LDC board ❷.
8. Connect the black/purple twisted-pair cable ❶ to the LDC board ❷.
9. This completes the bottom tray installation. To close the bottom tray and place the system back into the rack, follow the instructions in Closing the Bottom Tray.

Modules, Removal/Installation

Introduction

The DEC 4000 AXP Rackmount supports the same optional modules as described in the *DEC 4000 AXP Model 600 Series Options Guide*. However, because the DEC 4000 AXP Rackmount is a rackmounted unit, the modules are oriented differently. The following information shows where the modules are installed in the DEC 4000 AXP Rackmount.

Caution

Static electricity can damage modules and electronic components. Digital recommends using a grounded antistatic wrist strap when working with internal parts of a system or option.

Module Location and Installation

Figure 12–7 through Figure 12–10 show the modules listed below and where they are installed in the DEC 4000 AXP Rackmount system. The shaded area in the icon in each figure shows the location where the module is installed.

- B2001-AA CPU Module
- B2002-CA or -DA Memory Module
- B2101-AA I/O Module
- B2101-BA I/O Module

B2001 CPU Module

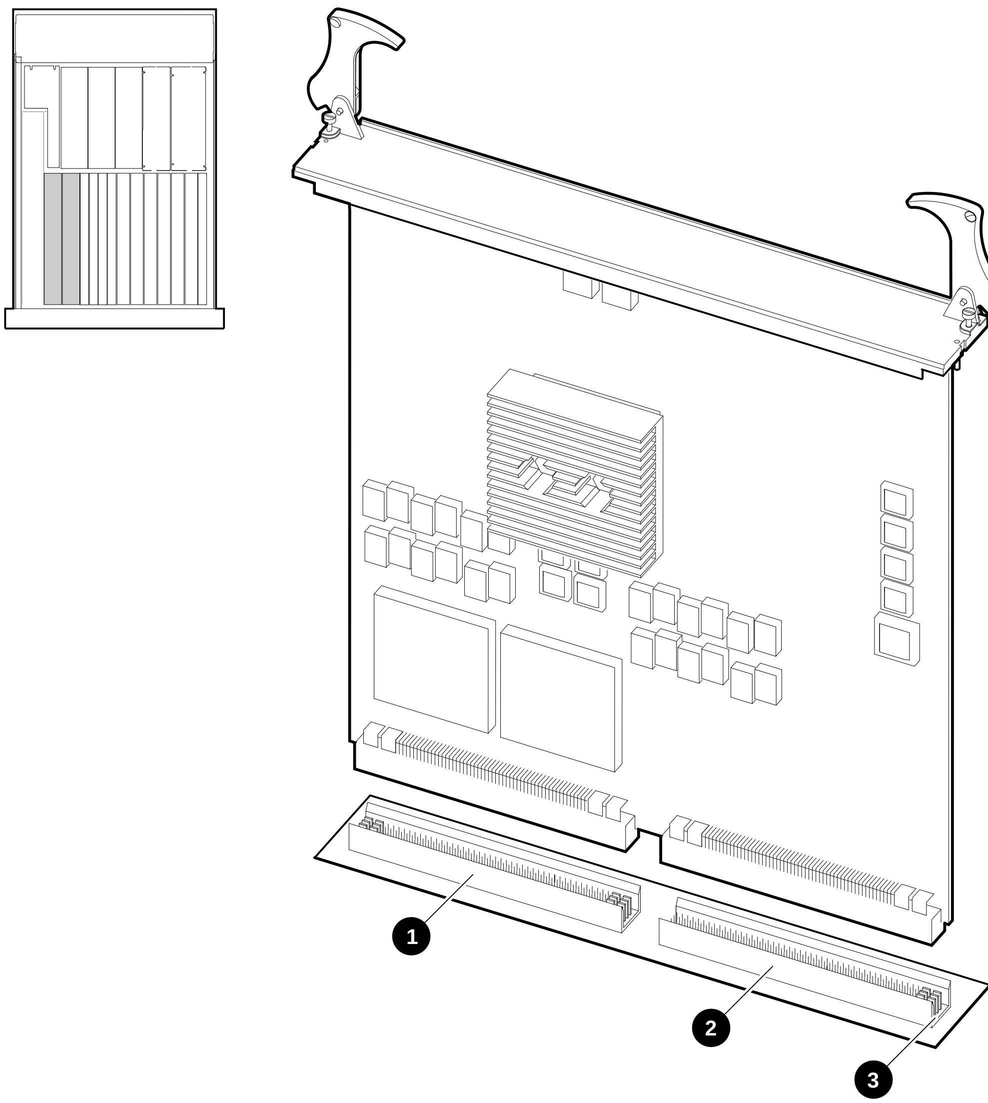
Figure 12–7 shows the B2001 CPU Module and where it is plugged into the system card cage.

❶ System bus

❷ Futurebus+

❸ I^2C bus

Figure 12–7 B2001 CPU Module



B2002 Memory Module

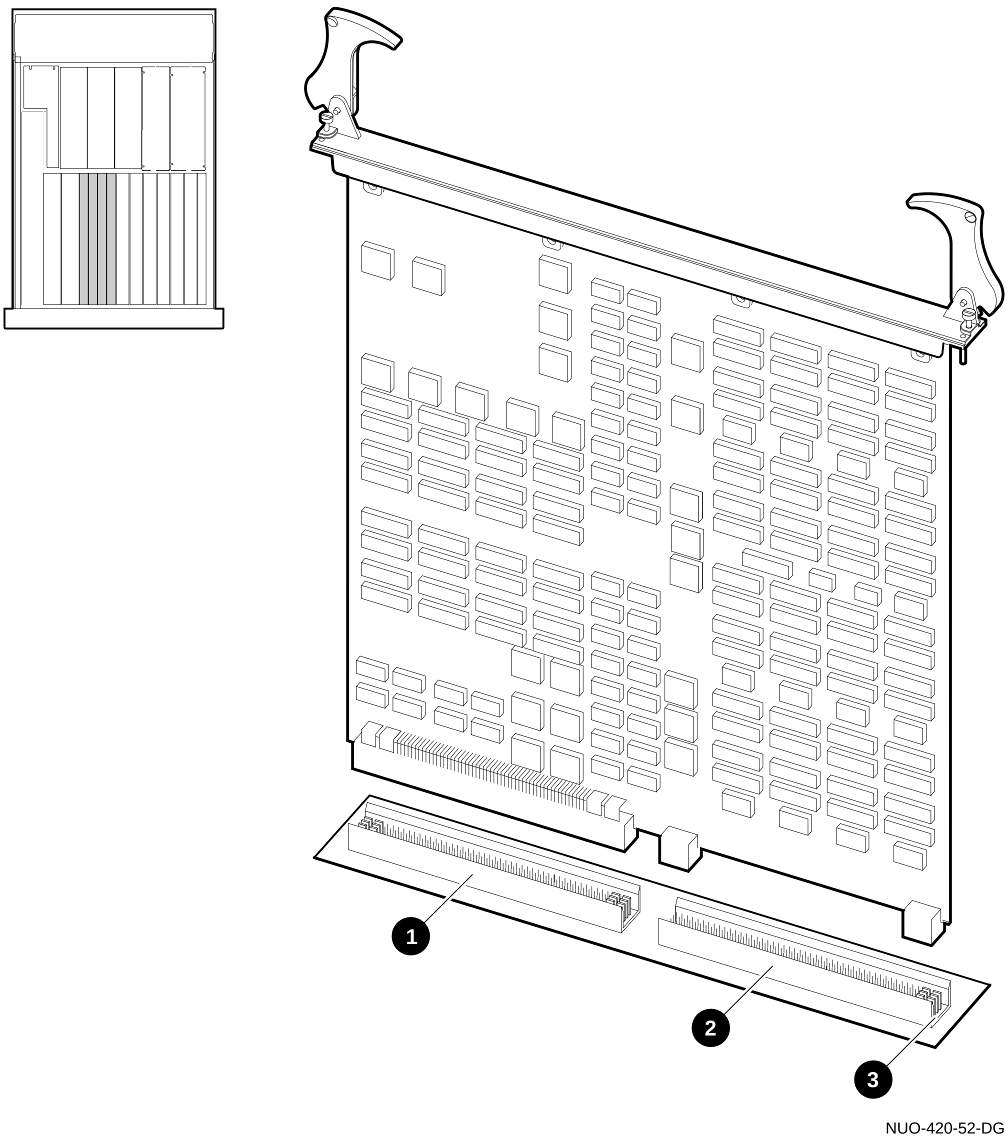
Figure 12–8 shows the B2002 (-CA or -DA) Memory Module and where it is plugged into the system card cage.

❶ System bus

❷ Futurebus+

❸ I²C bus

Figure 12–8 B2002 Memory Module



B2101-AA I/O Module

Figure 12–9 shows the B2101-AA I/O Module and where it is plugged into the system card cage.

❶ Ethernet port 1

❷ Ethernet port 2

❸ Thickwire fuse ok indicator

❹ Thickwire port

❺ Selection switch

❻ ThinWire port

❼ ThinWire fuse ok indicator

❽ Auxiliary serial port

❾ Console terminal ground lug

❿ Console terminal port

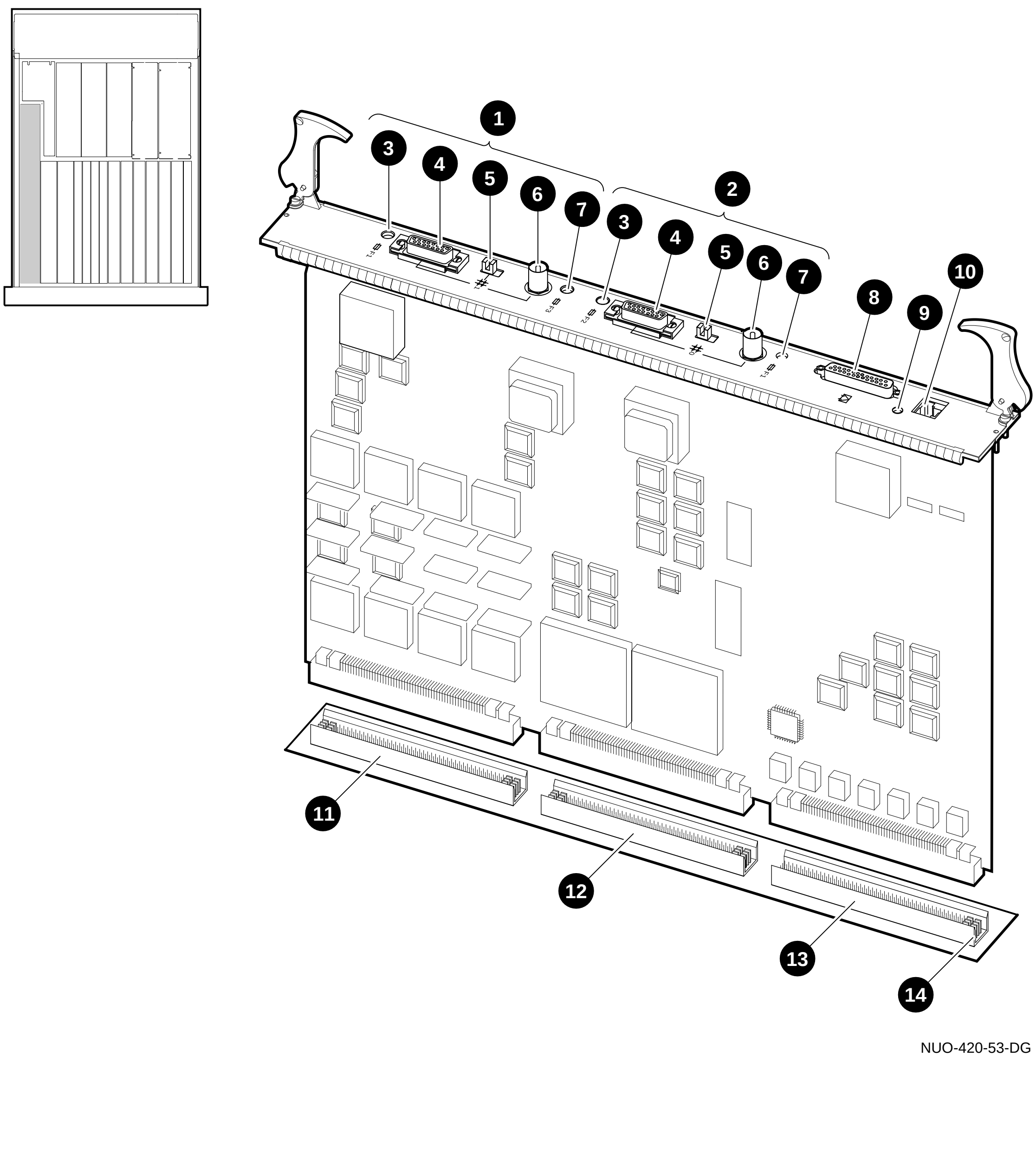
⓫ Storage bus (SCSI/DSSI)

⓬ System bus

⓭ Futurebus+

⓮ I^2C bus

Figure 12–9 B2101-AA I/O Module



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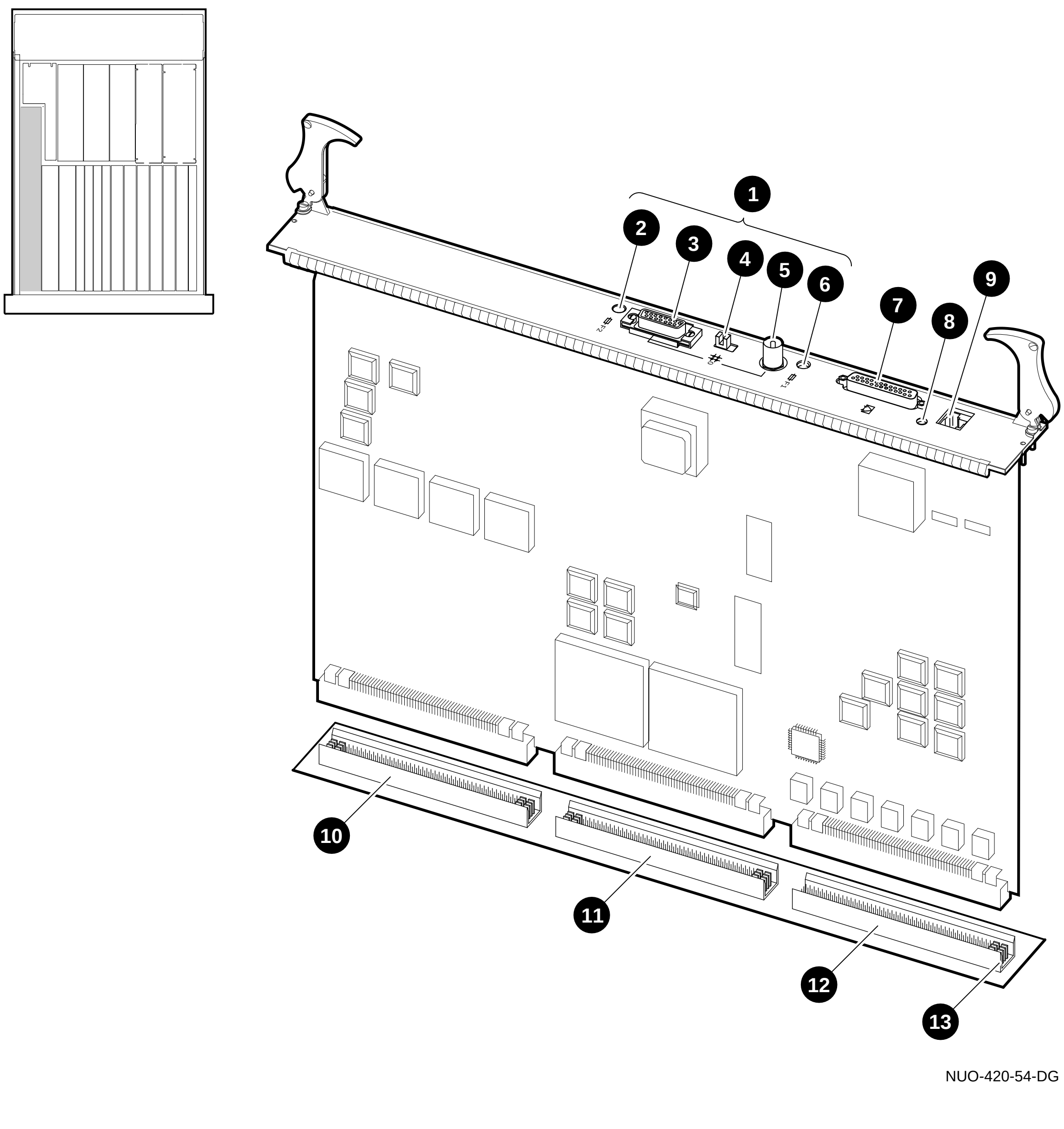
B2101-BA I/O Module

Figure 12–10 shows the B2101-BA I/O Module and where it is plugged into the system card cage.

❶ Ethernet port 0
❷ Thickwire fuse OK indicator
❸ Thickwire port
❹ Selection switch
❺ ThinWire port
❻ ThinWire fuse ok indicator
❼ Auxiliary serial port
❽ Console terminal ground lug
❾ Console terminal port
❿ Storage bus (SCSI)
⓫ System bus
⓬ Futurebus+
⓭ I^2C bus

Figure 12–10 B2101-BA I/O Module



OCP, Removal/Installation

OCP Removal

To remove the OCP, refer to Figure 12–11 and proceed as follows:

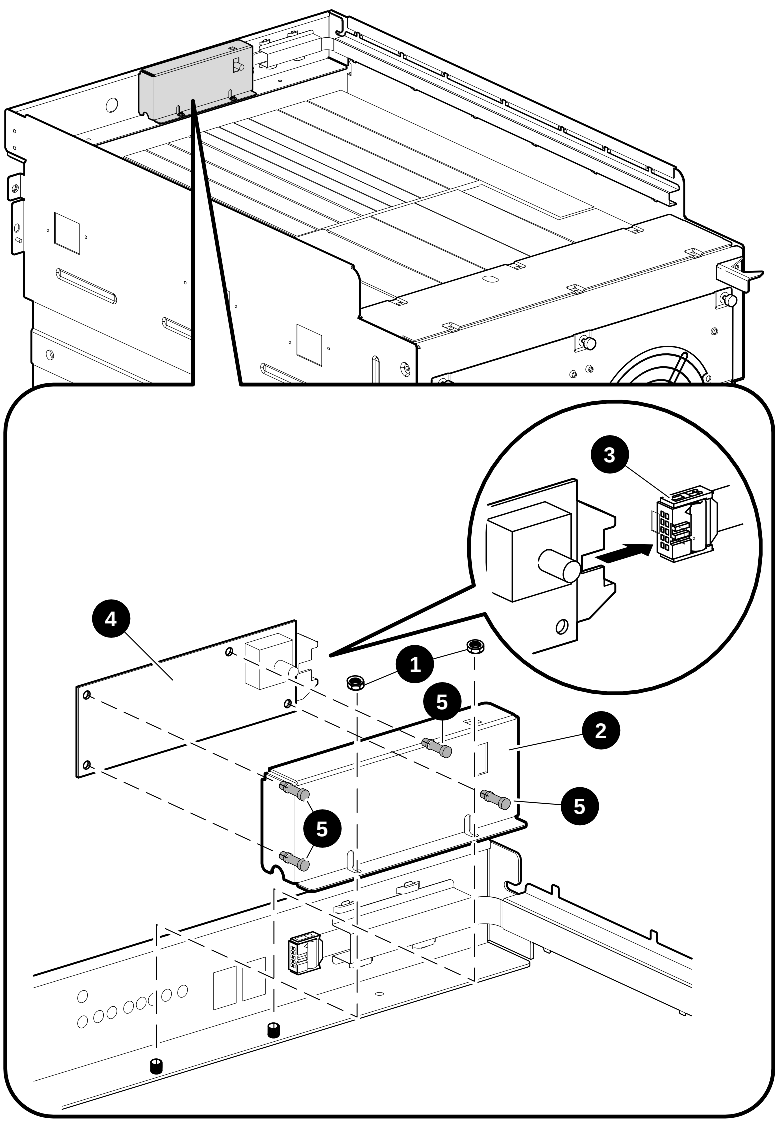
1. Pull the system out of the rack using the procedure in Extending Chassis For Service.
2. Remove and save the two nuts ❶ fastening the OCP rear cover ❷ to the chassis.
3. Remove the OCP rear cover ❷.
4. Disconnect the OCP cable ❸.
5. Remove the OCP board ❹ from the inside of the OCP rear cover by pulling it off from the four locking standoffs ❺.

OCP Installation

To install the OCP, refer to Figure 12–11 and proceed as follows:

1. Push the OCP board ❹ on to the four locking standoffs ❺.
2. Connect the OCP cable ❸.
3. Position the OCP rear cover ❷ over the OCP board. Secure the OCP rear cover to the chassis using two nuts ❶.
4. The OCP is now installed. To place the system back into the rack, follow the instructions in Placing the System Back into the Rack.

Figure 12–11 Removing the OCP



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I/O Daughter Board Assembly, Removal/Installation

I/O Daughter Board Assembly Removal

To remove the I/O daughter board assembly, proceed as follows:

1. Pull the system out of the rack and open the bottom tray as described in Opening the Bottom Tray.

Note

Before performing step 2, note that the cables connected to J3 and J4 on the I/O daughter board assembly are reversible. Mark which cable connects to J3 and J4 before disconnecting the cables. Other cables connected to the I/O daughter board assembly are keyed and cannot be misconnected.

2. Disconnect the cables (shown in Figure 12–12) from the I/O daughter board assembly.

   ❶ Ribbon cable from backplane (connects to J3 on I/O daughter board assembly)

   ❷ Ribbon cable from backplane (connects to J4 on I/O daughter board assembly)

   ❸ Ribbon cable from backplane (connects to J1 on I/O daughter board assembly)

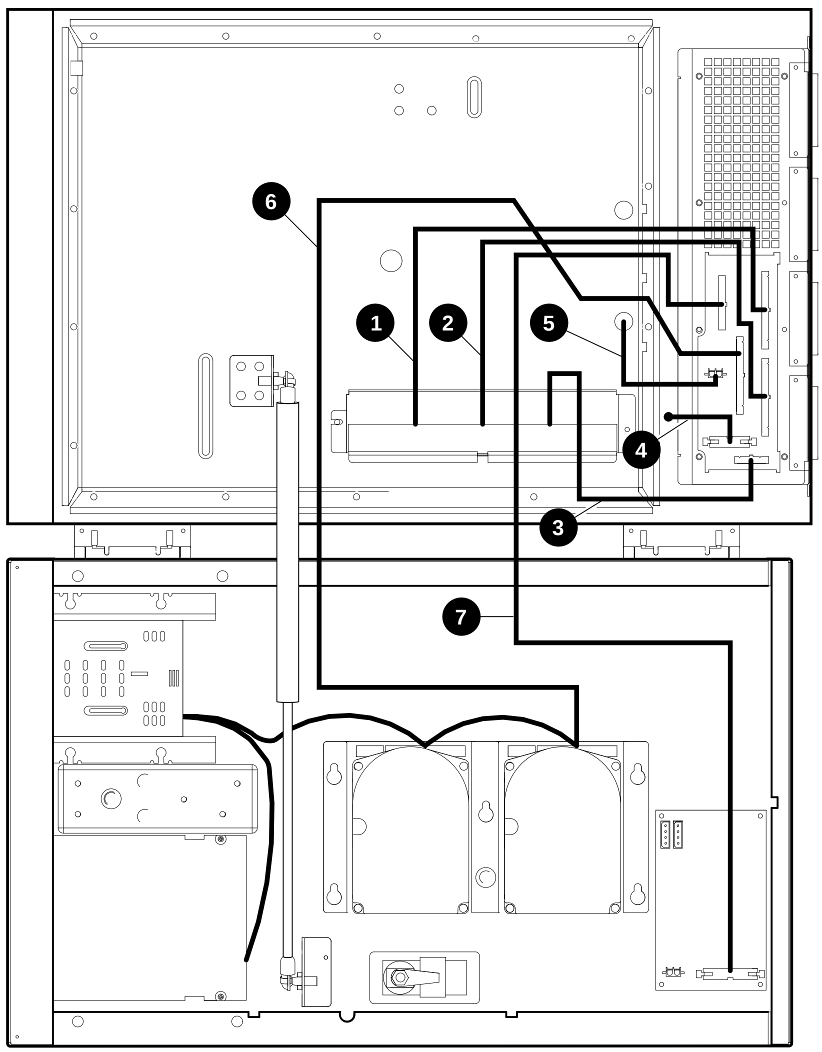
   ❹ Ribbon cable from OCP (connects to J9 on I/O daughter board assembly)

   ❺ Red/Black twisted-pair cable from backplane (connects to J2 on I/O daughter board assembly)

   ❻ Round white SCSI cable from removable-media device (connects to J11 on I/O daughter board assembly)

   ❼ Ribbon cable from LDC board (connects to J10 on I/O daughter board assembly)

Figure 12–12 I/O Daughter Board Cable Connections



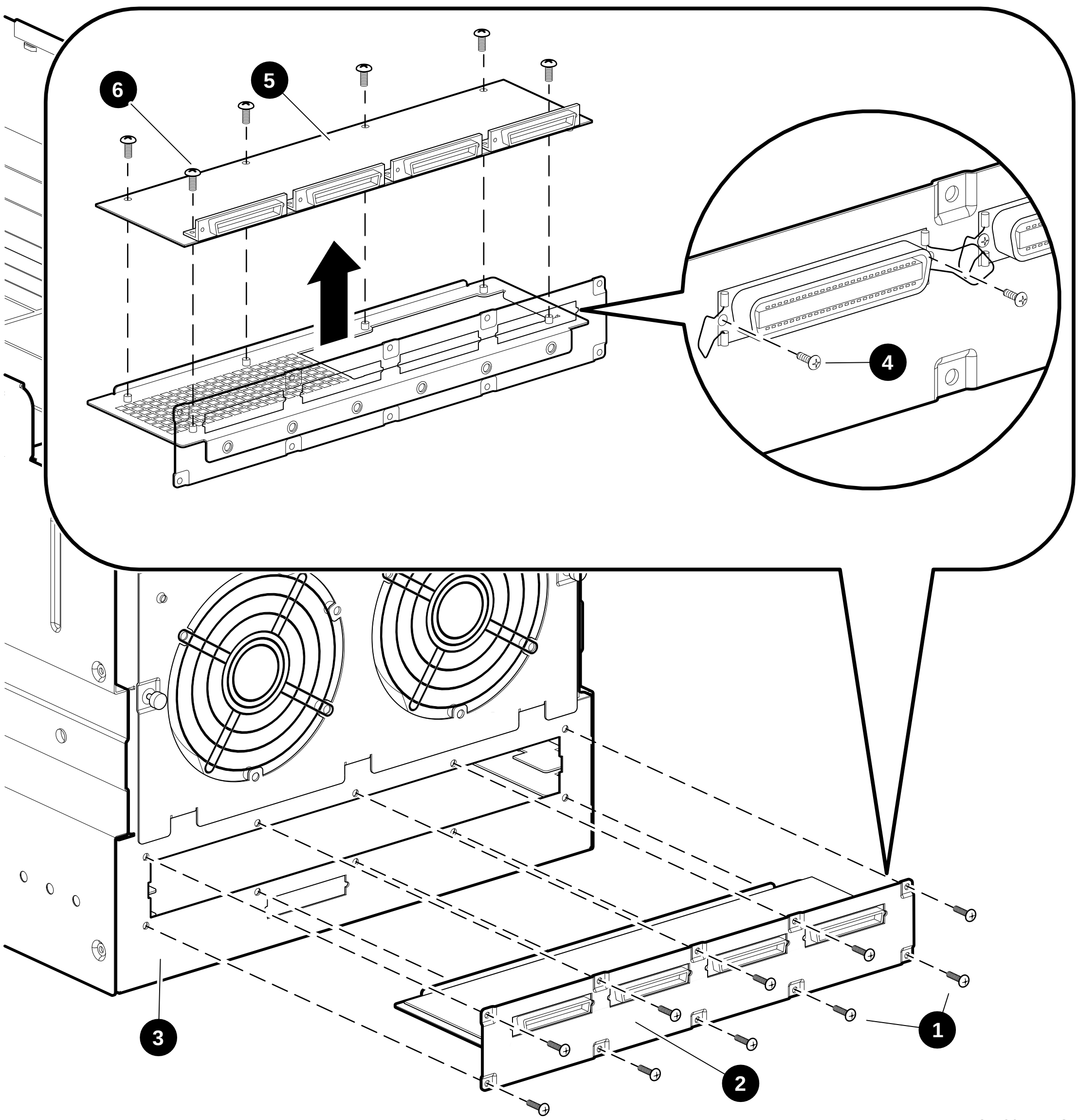
3. Refer to Figure 12–13. Remove and save the ten Phillips screws ❶ fastening the rear I/O assembly ❷ to the rear of the system chassis ❸.

Caution

Be careful not to damage the connector on the underside of the I/O daughter board when pulling it out of the chassis.

4. Pull the rear I/O assembly ❷ out of the system chassis.❸.
5. Remove eight screws ❹ attaching the I/O daughter board to the rear I/O weldment.
6. Remove six screws ❻ attaching the I/O daughter board to the rear I/O weldment. Remove the I/O daughter board ❺.

Figure 12–13 Removing the I/O Daughter Board Assembly



I/O Daughter Board Assembly, Installation

To install the I/O daughter board assembly, proceed as follows:

Caution

Be careful not to damage the connector on the underside of the I/O daughter board when pushing it into the chassis.

1. Place the four I/O daughter board port connectors through the opening of the rear I/O weldment ❷.
2. Fasten the port connectors to the rear I/O weldment ❷ using eight screws ❹.
3. Fasten the I/O daughter board assembly ❺ to the rear I/O weldment ❷ using six screws ❻.
4. Insert the I/O daughter board assembly ❺ into the rear of the system chassis ❸, and fasten it using ten Phillips screws ❶ (see Figure 12–13).
5. Connect the cables ❶ to the I/O daughter board assembly ❺ as shown in Figure 12–12. Be sure to connect cables J3 and J4 according to the markings done in the removal procedure.
6. The I/O daughter board assembly is now installed. To place the system back into the rack, follow the instructions in Closing the Bottom Tray.

LDC Board, Removal/Installation

LDC Board Removal

To remove the LDC board, refer to Figure 12–14 and proceed as follows:

1. Pull the system out of the rack and open the bottom tray as described in Opening the Bottom Tray.
2. Remove cables ❶ ❷ ❸ ❹ from the LDC board ❺.
3. Pull the LDC board ❺ off the four locking standoffs ❻.

LDC Board Installation

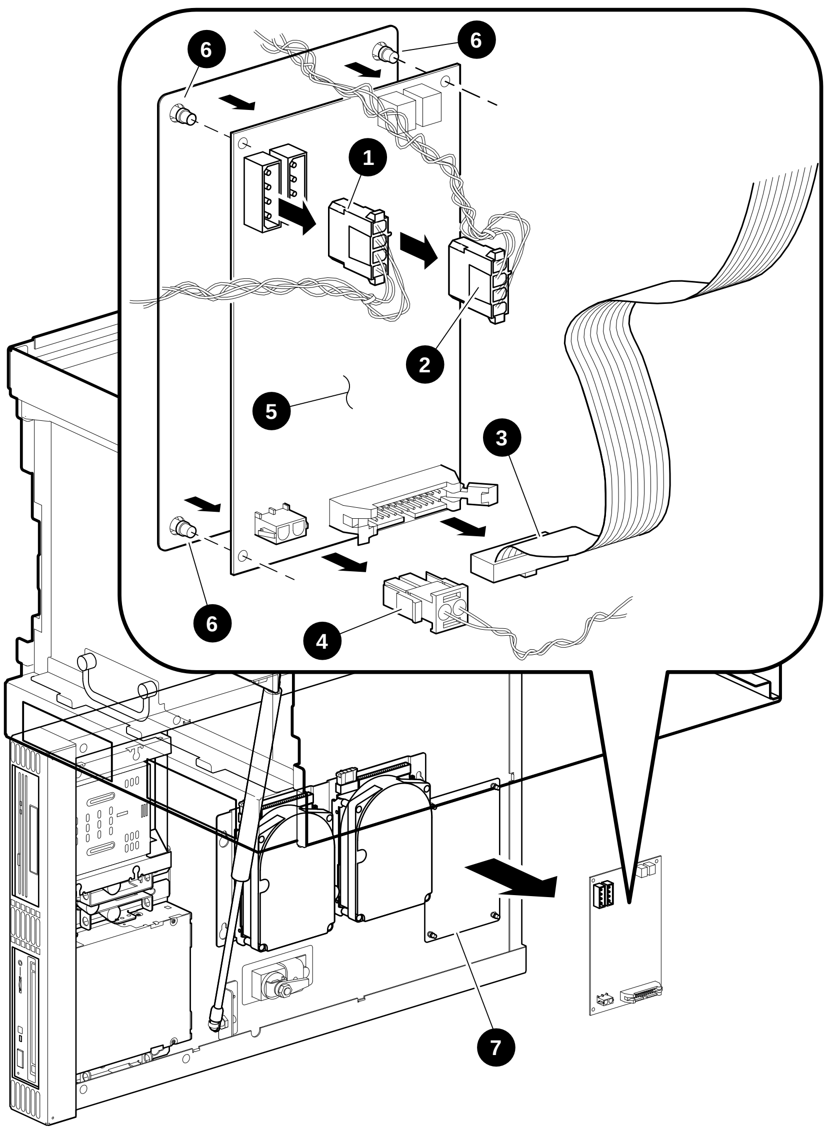
To install the LDC board, refer to Figure 12–14 proceed as follows:

Caution

Make sure that the white isolator ❼ is present before installing the LDC board ❺.

1. Push the LDC board ❺ on to the four locking standoffs ❻.
2. Connect cables ❶ ❷ ❸ ❹ to the LDC board ❺.
3. The LDC board is now installed. To place the system back into the rack, follow the instructions in Closing the Bottom Tray.

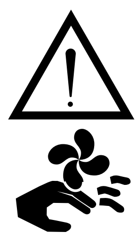
Figure 12–14 Removing the LDC



Fan, Removal/Installation

Fan Removal

To remove a fan, refer to Figure 12–15 and proceed as follows:



Warning

To prevent injury from revolving fan blades, make sure the system is shut down and fans blades are not moving before performing the following procedure.

1. From the rear of the system chassis, loosen the five captive screws ❶ fastening the rear cover ❷ of the fan assembly ❸ to the system chassis ❹.
2. Lift out the fan assembly ❸ part way (just enough to reach in and disconnect the two power connectors ❺).
3. Lift the fan assembly ❸ out of the rear of the system.
4. To remove a fan from the fan assembly, proceed as follows:
   a. Remove the M4 screw and washer ❾ fastening the ground lead ❿ to the fan ⓫. The screw hole on the fan is marked M.
   b. To remove the fan ⓫ from the rear cover ❷, remove and save the four retaining screws ❻ and other hardware fastening the fan and finger guard ⓬ to the rear cover. Note how the hardware was installed.

Fan Assembly Installation

To install a fan onto the rear cover and then install the rear cover in the rear of the system, refer to Figure 12–15 and proceed as follows:

Warning

To prevent injury, make sure the system is shut down before performing the following procedure.

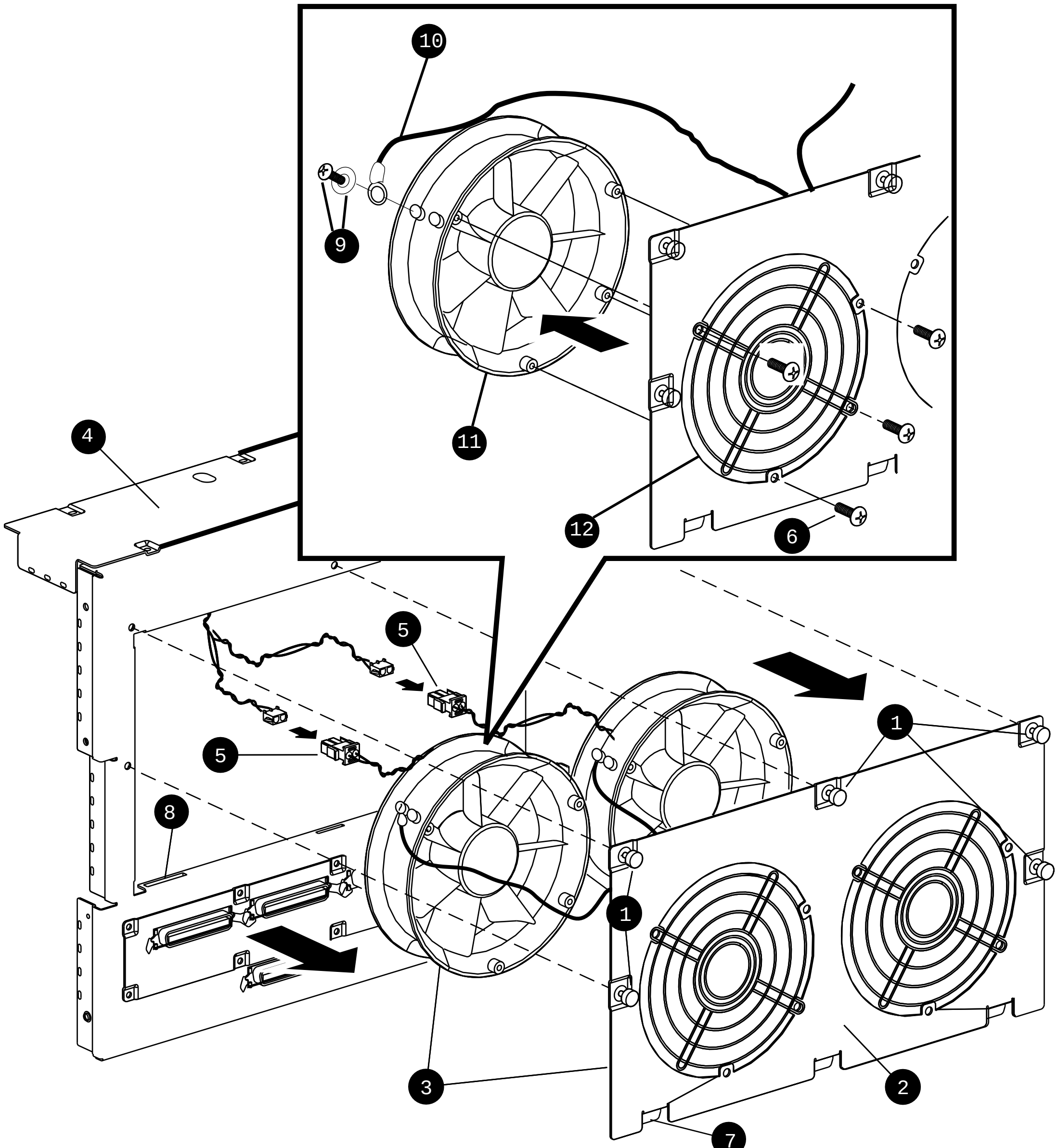
1. Install the fan on the rear cover as follows:
   a. Using the M4 screw and washer ❾, fasten the ground lead ❿ to the fan ⓫. Use the metric screw hole in the fan marked M.
   b. Fasten the fan ⓫ and finger guard ⓬ to the rear cover ❷, using the four retaining screws ❻ and other hardware saved when removing the fan from the rear cover.

Note

Make sure the fan is installed so that the air flows from front to rear in the system.

2. Rest the three tabs ❼ on the bottom edge of the rear cover ❷ in the system chassis slots ❽.
3. Connect the two power connectors ❺.
4. Fasten the rear cover to the system chassis using the five captive screws ❶.

Figure 12–15 Removing the Fan Assembly



Disk Drives, Removal/Installation

Types of Disk Drives

The bottom tray supports any half-height SCSI storage device described in the *DEC 4000 AXP Model 600 Series Options Guide*. Full height storage devices are supported as external devices installed in the rack and connected via the system I/O ports.

The bottom tray supports two fixed-media mass storage devices (hard disk drives) and two removable-media mass storage devices (tapes, CD-ROM drives).

The disk drives are mounted on brackets that lock into position in the bottom tray. One or two hard disk drives can be mounted on a mounting bracket installed in the center of the bottom tray. Removable-media disk drives are mounted on separate mounting brackets toward the front of the bottom tray and accessible through openings in the front of the tray. Each drive is attached to the associated mounting bracket by four screws.

Disk Drive Removal

The disk drive removal procedure is similar for all the drives. The following procedure uses the removal of a hard disk drive as a specific example.

To remove a disk drive, refer to Figure 12–16 and proceed as follows:

1. Pull the system out of the rack and open the bottom tray as described in Opening the Bottom Tray.
2. Disconnect the power ❶ and data cables ❷ from the hard disk drive ❸.
3. Pull out and then turn the knurled plunger ❹ one quarter turn counterclockwise to disengage it.
4. Slide the assembly backward to release the mounting bracket ❺ from under the head of the drive mounts ❻, and then remove the assembly.
5. To remove a drive from the mounting bracket, remove the four retaining screws ❼.

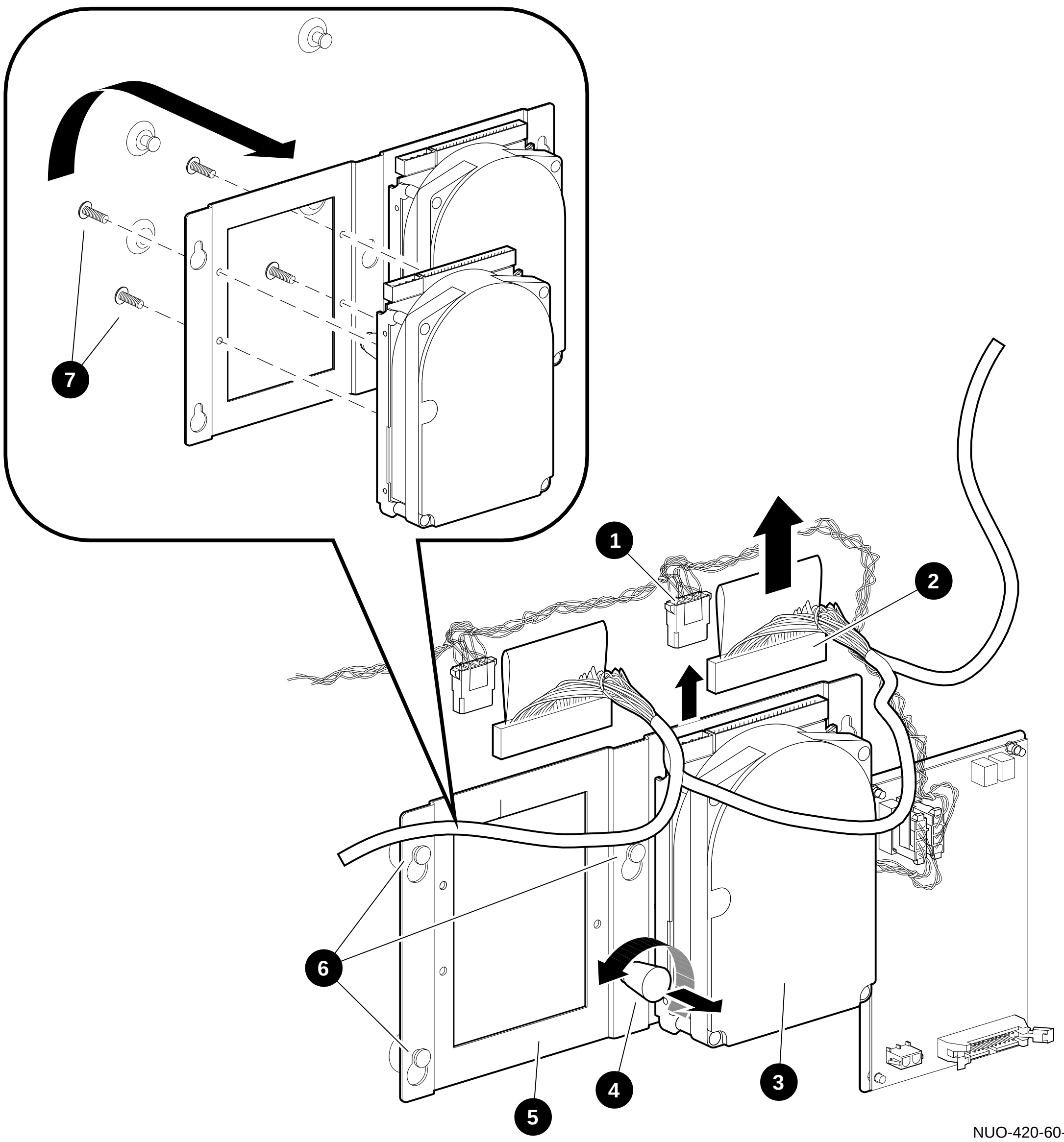
Note

The hard disk drive mounting bracket is a wide mounting bracket that can hold up to two hard disk drives.

Note

The removable-media drives are secured by two screws going through mounting holes in the left and right sides of their mounting bracket. If replacing the drive with another of the same type, note and use the same mounting holes.

Figure 12–16 Removing a Disk Drive



Setting the ID Jumper or Switches

Before installing a disk drive it may be necessary to set the ID jumper or switches, if applicable.

If a disk drive is being replaced by the same type, use the same jumper or switch settings as the old drive. For information concerning ID jumper or switch settings for other disk drives, refer to the *DEC 4000 Model 600 Series Options Guide* (EK-KN430-OG).

Disk Drive Installation

For a list of disk drives that can be installed in the bottom tray, refer to Table 7–1. For a list of disk drives supported externally, refer to Table 7–2.

To install a disk drive, refer to Figure 12–16 and proceed as follows:

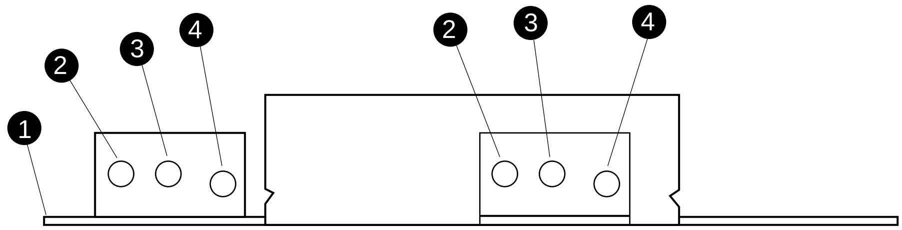
1. Set the ID jumper or ID switches as applicable (refer to *DEC 4000 Model 400 Series Options Guide* for settings).
2. Attach the drive to the mounting bracket using four retaining screws ❼. Ensure the side of the mounting bracket marked UP faces the bottom of the drive.

Note

When installing a removable-media drive, see Figure 12–17 for the correct bracket mounting holes used to attach the replacement drive to the bracket.

3. Align the mounting holes in the mounting bracket ❺ with the drive mount heads ❻, and then push in and slide the assembly downward as far as possible.
4. Push in and turn the knurled plunger ❹ one quarter turn clockwise to engage it.
5. Connect the power ❶ and data cables ❷ to the hard disk drives ❸. Ensure that the cables are routed as shown in the figure.
6. The hard disk drive is now installed. To close the bottom tray and place the system back into the rack, follow the instructions in Closing the Bottom Tray.

Figure 12–17 Removable-Media Drive Mounting Bracket, Mounting Holes



1. Removable-media mounting bracket, side view, front
2. Mounting holes for TLZ06 and RRD42 drives (use metric hardware only)
3. Mounting holes, not used
4. Mounting holes for TZ30 drive (use English hardware only)

Fingerstock, Removal/Installation

When to Replace Fingerstock

The fingerstock is located along the top edge of the bottom tray. Replace the fingerstock when finger segments are broken, lifted out of place, or no longer retain a curved shape for good contact.

Fingerstock Lengths

There are five different lengths of replacement fingerstock. Table 12–2 provides a list of the different lengths and the associated part number. Figure 12–18 shows how and where the fingerstock is installed according to Table 12–2.

Table 12–2 Fingerstock Replacement Lengths

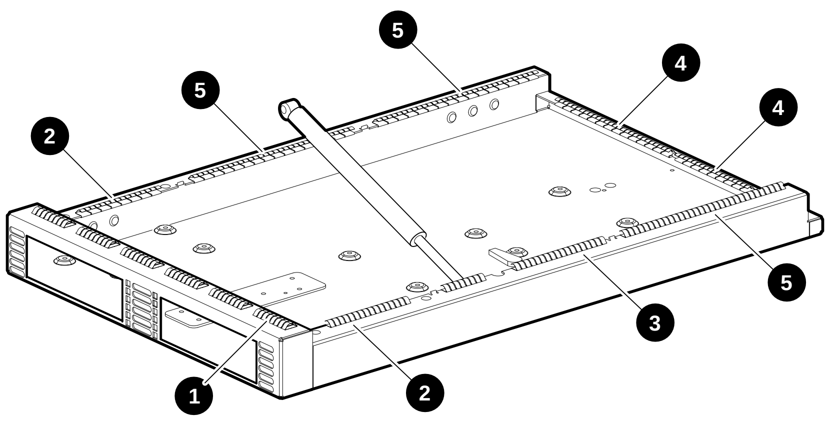
Figure Ref.	Fingerstock Length (Inches)	Part Number
❶	2	12-26922-06
❷	4	12-40169-01
❸	5	12-40169-02
❹	6.5	12-40169-03
❺	8	12-40169-04

Fingerstock Replacement

To replace one or more segments of fingerstock, refer to Figure 12–18 and proceed as follows:

1. Pull the system out of the rack and open the bottom tray as described in Opening the Bottom Tray.
2. Identify the damaged fingerstock according to the criteria previously mentioned.
3. Identify the specific segments needed according to Figure 12–18 and Table 12–2.
4. Fingerstock ❷ through ❺ slide on or off the edge of the bottom tray. ❶ is removed by pressing down and lifting one side out to release it from the tray.

Figure 12–18 Fingerstock Installation



SCSI to DSSI Adapters

SCSI to DSSI Adapters, Installation

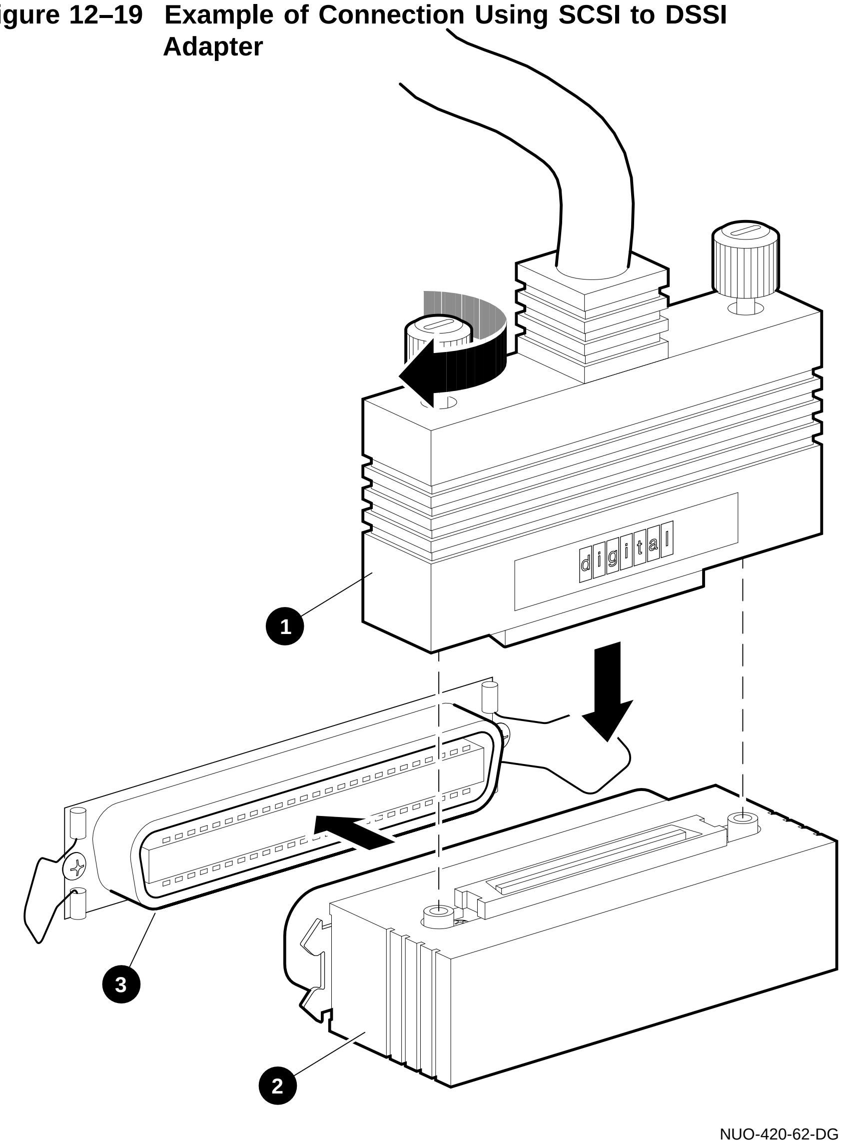
The SCSI to DSSI adapter is plugged into a SCSI port so that a DSSI cable can be connected. Figure 12–19 shows an example of how a DSSI cable is connected to a SCSI port using the adapter.

❶ DSSI Cable

❷ SCSI to DSSI Adapter

❸ SCSI port

Figure 12–19 Example of Connection Using SCSI to DSSI Adapter



Backplane, Removal/Installation

Backplane, Removal

To remove the backplane, you need to:

- Pull out the system from the cabinet
- Remove the system modules and the power system modules
- Lower the bottom tray
- Remove the bottom tray
- Remove the backplane

Warning

Before performing any of the following procedures, be sure that the ac circuit breaker located at the top of the system is in the OFF (O) position and that the power cord is disconnected from the ac power source.

Pull Out the System

Refer to Extending Chassis For Service at the beginning of this chapter for instructions on how to pull the system out of the rack.

Remove the System Modules and the Power System Modules

Disconnect the fan power cable going to the connector near the ac circuit breaker of the power supply. Each module is fastened to the card cage by two captive screws on their faceplate. Loosen the screws and eject the modules using their ejector levers. Remove the modules from the card cage.

Lower the Bottom Tray

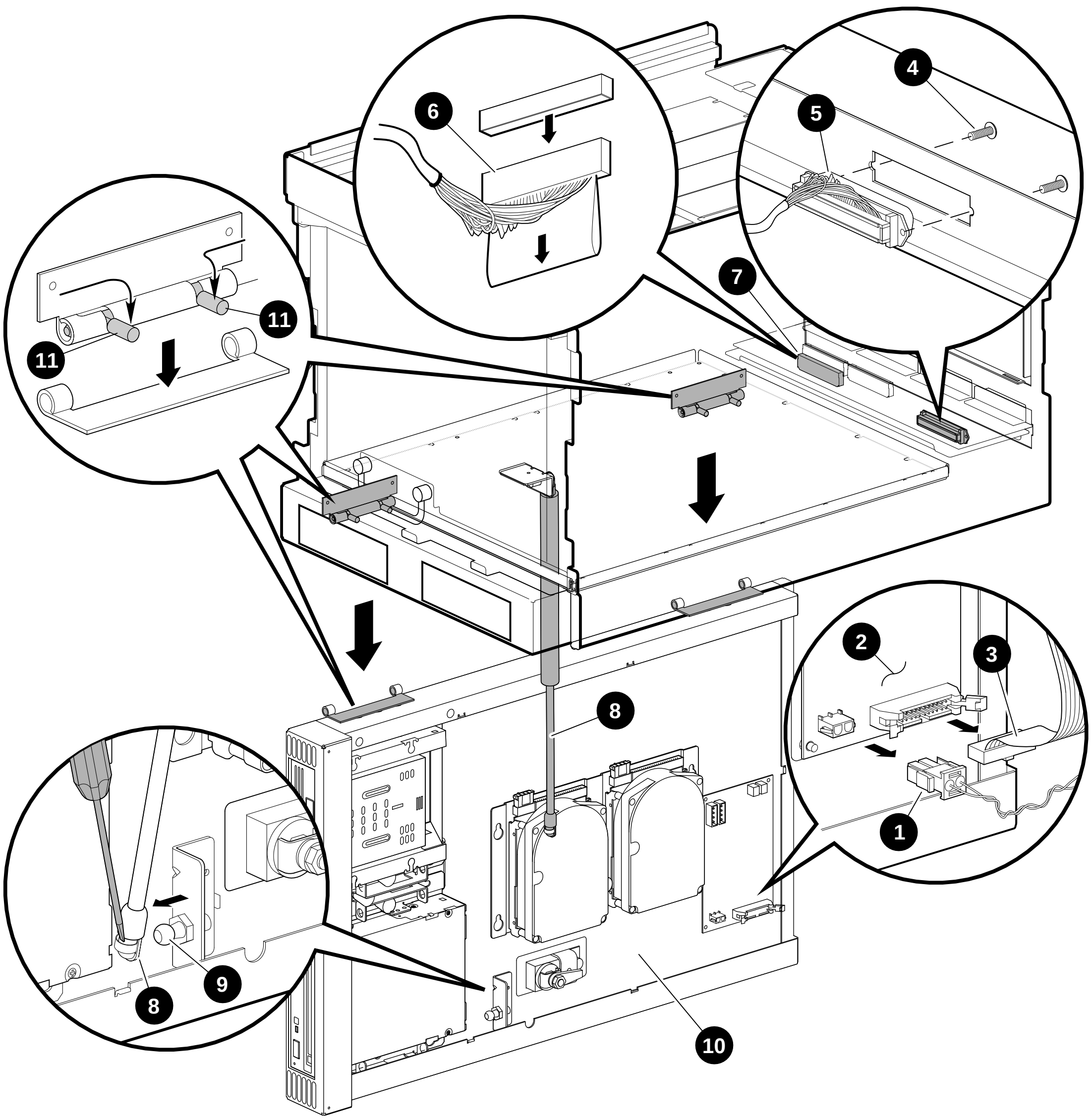
Refer to Opening the Bottom Tray at the beginning of this chapter for instructions on how to lower the bottom tray.

Remove the Bottom Tray

To remove the bottom tray, refer to Figure 12–20 and proceed as follows:

1. Pull the system out of the rack and open the bottom tray as described in Opening the Bottom Tray.
2. Disconnect the black/purple twisted-pair cable ❶ from the LDC board ❷.
3. Disconnect the I/O cable (flat cable) ❸ from the LDC board ❷.
4. From the rear of the unit, remove one retaining screw ❹ from the SCSI connector ❺.
5. Loosen the other retaining screw and remove the SCSI connector. This cable comes from the fixed-media drive.
6. Disconnect the white SCSI cable ❻ from the I/O daughter board ❼. This cable comes from the removable-media drive.
7. Disconnect the end of the gas strut ❽ attached to the ball stud ❾ in the bottom tray ❿. This is done by inserting a flat blade screwdriver as shown in Figure 12–20. Twist the screwdriver to release the gas strut from the ball stud. Then pull the gas strut away from the ball stud.
8. Repeat step 7 to remove the other end of the gas strut.
9. While one person holds the bottom tray ❿ in place (open position), squeeze the two hinge pins ⓫ on each hinge as shown in Figure 12–20 into the locked position.
10. Separate and remove the bottom tray ❿ from the hinges and the system.

Figure 12–20 Removing the Bottom Tray



Remove the Backplane

To remove the backplane, refer to Figure 12–21 and Figure 12–22 and proceed as follows:

Note

Before performing step 1, note that the cables connected to J3 and J4 on the I/O daughter board assembly are reversible. Mark which cable connects to J3 and J4 before disconnecting the cables. Other cables connected to the I/O daughter board assembly are keyed and cannot be misconnected.

1. Refer to Figure 12–21 and disconnect three ribbon cables ❶❷❸, and red/black twisted-pair cable ❹ from the I/O daughter board ❺.
2. Refer to Figure 12–22 and remove 17 screws ❼ fastening the perimeter of the backplane ❻ to the chassis.
3. While holding up the backplane ❻ with one hand, remove the center screw ❽. Then lower and remove the backplane.

Note

Be sure that the EMI gasket ❾ remains in place.

4. This completes the backplane removal procedure.

Installing the Backplane

To install the backplane, reverse the steps in the removal procedure. Be sure that the EMI gasket remains in place.

Figure 12–21 I/O Daughter Board Cable Connections

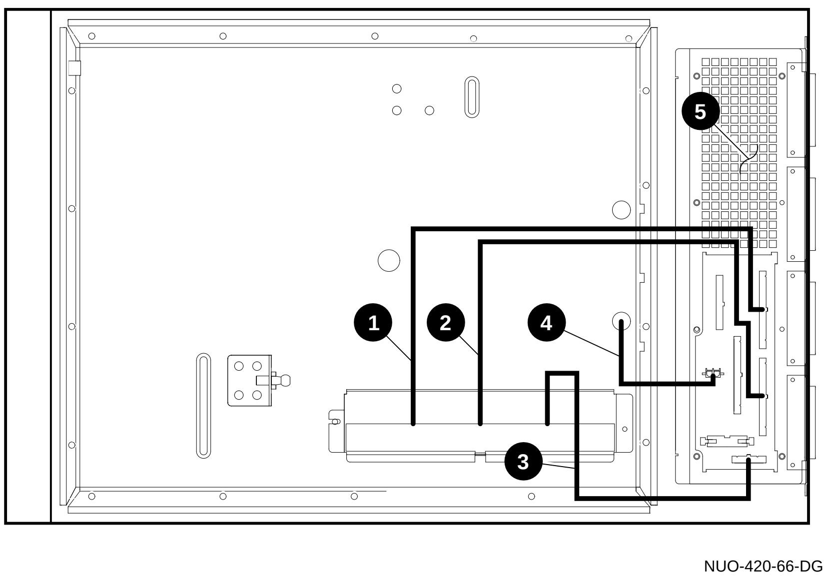
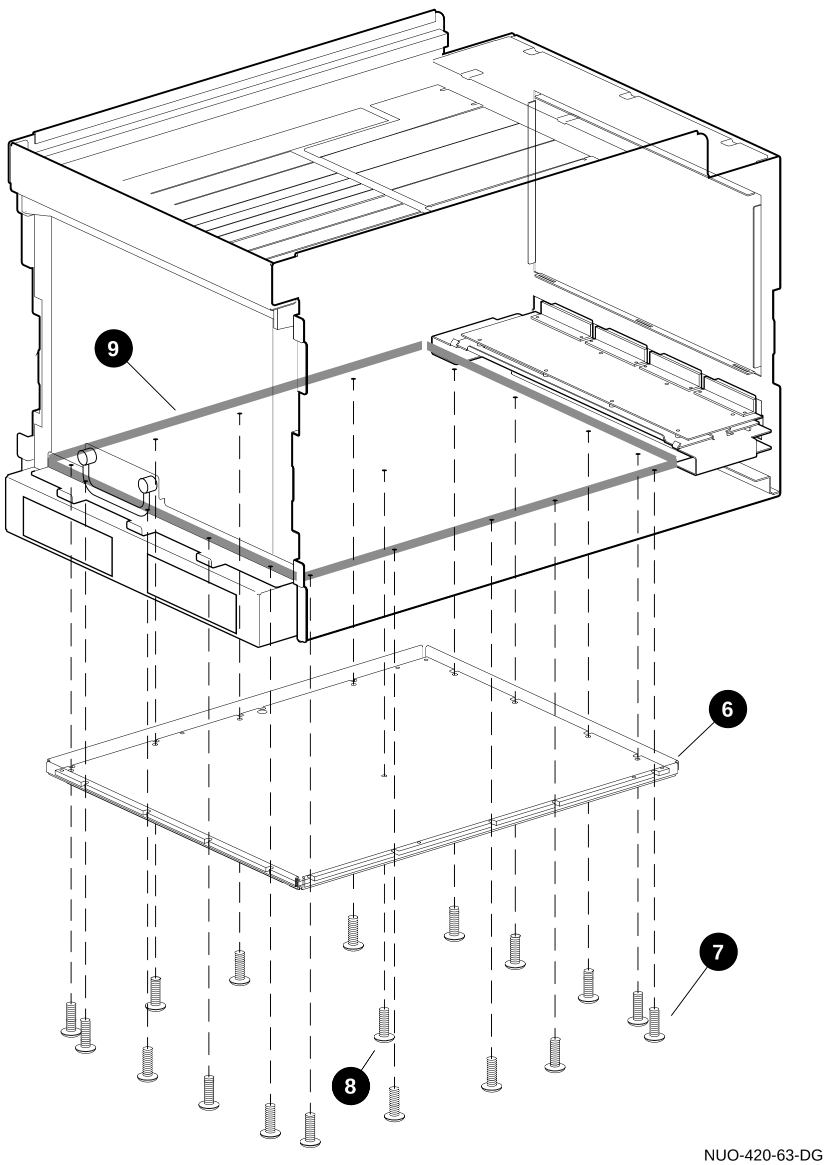


Figure 12–22 Removing the Backplane



A
Specifications

Table A–1 lists the specifications for the DEC 4000 AXP Rackmount system.

Table A–1 Specifications

Specification	Measurement
Height	44.4 cm (17.5 in)
Width	48.26 cm (19 in)
Depth	75.7 cm (29.8 in) with mounting brackets
Weight	65.7 kg (146 lbs)
Operating temperature	10-40°C (50-104°F)
Relative humidity (noncondensing)	20-80% operating 10-90% nonoperating
Heat dissipation	@1400 W, 4774 Btu/hr
Minimum airflow required	200 linear ft/minute
Maximum operating altitude	2438 m (8000 ft)
Maximum power consumption	1650 W
Operating power range (1 phase)	104 V ac to 128 V ac/208 V ac to 256 V ac
Power cord length	2.4 m (8 ft)
Declared operating acoustic level	LWAd=6.3B/LpAm=44 dBA DEC4000 with 4 SCSI drives, ISO 9296

B

Field Replaceable Units (FRU)

Introduction

This appendix lists the FRUs associated with the DEC 4000 AXP Rackmount system.

FRUs

Table B–1 and Table B–2 provide the Recommended Spares List (RSL) and other Field Replaceable Units (FRU), respectively, that are unique to the DEC 4000 AXP Rackmount system. Combined, they form the complete FRU listing for the DEC 4000 AXP Rackmount system.

Table B–1 Recommended Spares List Unique to the DEC 4000 AXP Rackmount

Part Number	Description	Quantity per Assy
54-22569-01	OCP Module	1
54-20868-01	LDC Power Board	1
54-21779-01	I/O Daughter Board	1
12-36202-01	Fans	2
12-39838-01	Adaptor, SCSI to DSSI	4
12-30552-01	SCSI Loopback Connector	5
17-03719-01	Fan Cable Harness Assy	1
17-03720-01	Disk Cable Assy, 50 cond	1
70-30956-01	Cable Assy, OCP	1
17-03080-01	SCSI Power Cable	2
17-01476-02	LDC Data Cable	1

Table B–2 Other Field Replaceable Units (FRUs)

Part Number	Description	Quantity per Assy
70-30518-01	Back Plane Assy	1
74-46132-01	Bracket, RRD42/TZ30	1
74-46133-01	Bracket, RZ2x/TL06	1
90-11194-01	Key Door, OCP	1
12-40122-01	Bottom Tray Latch Assy	1
12-40128-01	Cylinder, Hydraulic	1
12-40169-01	Finger Stock, Bottom Tray Section A, 8 Segments (4.00")	2
12-40169-02	Finger Stock, Bottom Tray Section B, 10 Segments (5.00")	1
12-40169-03	Finger Stock, Bottom Tray Section C, 13 Segments (6.50")	2
12-40169-04	Finger Stock, Bottom Tray Section D, 16 Segments (8.00")	2
12-40169-05	Finger Stock, Storage Media Mounting Plate, 2 Segments (1.00")	3
12-26922-06	Finger Stock, Bottom Tray Section E, 7 Segments (2.00")	6
12-28686-27	Finger Stock, Fan Panel Section A, 20 Segments (3.74")	4
12-28686-26	Finger Stock, Fan Panel Section B, 27 Segments (5.05")	2
12-28686-25	Finger Stock, Fan Panel Section C and Front Panel SCSI Filler Plate, 35 Segments (6.54")	4
12-28686-28	Finger Stock, Fan Panel Section D and Rear I/O Panel Section A, 15 Segments (2.79")	10
12-28686-29	Finger Stock, Rear I/O Panel Section B and Front Panel SCSI Filler Plate, 8 Segments (1.50")	4

Glossary

ANSI

American National Standards Institute, an organization that develops and publishes standards for the computer industry.

autoboot

The process by which the system boots automatically.

auxiliary serial port

The EIA 232 serial port on the I/O module of the DEC 4000 AXP Rackmount system. This port provides asynchronous communication with a device, such as a modem.

availability

The amount of scheduled time that a computing system provides application service during the year. Availability is typically measured as either a percentage of "uptime" per year or as system "unavailability," the number of hours or minutes of downtime per year.

BA641

The enclosure that houses the DEC 4000 AXP Rackmount system. The BA641 is compatible with the departmental environment and is designed for maximum flexibility in system configuration. Employing an open system architecture, the BA641 incorporates a state-of-the-art Futurebus+ area, which allows for expansion of the DEC 4000 AXP Rackmount system with options available from Digital and other vendors.

bandwidth

Bandwidth is often used to express “high rate of data transfer” in an I/O channel. This usage assumes that a wide bandwidth may contain a high frequency, which can accommodate a high rate of data transfer.

baud rate

The speed at which data is transmitted over a data line; baud rates are measured in bits per second.

bit

Binary digit. The smallest unit of data in a binary notation system, designated as 0 or 1.

boot

Short for bootstrap. Loading an operating system into memory is called booting.

boot device

The device from which the system bootstrap software is acquired.

boot flags

Boot flags contain information that is read and used by the bootstrap software during a system bootstrap procedure.

boot server

A system that provides boot services to remote devices such as network routers and VAXcluster satellite nodes.

bootstrap

See boot.

bus

A group of signals that consists of many transmission lines or wires. It interconnects computer system components to provide communications paths for addresses, data, and control information.

byte

Eight contiguous bits starting on an addressable byte boundary. The bits are numbered right to left, 0 through 7.

cache memory

A small, high-speed memory placed between slower main memory and the processor. A cache increases effective memory transfer rates and processor speed. It contains copies of data recently used by the processor and fetches several bytes of data from memory in anticipation that the processor will access the next sequential series of bytes.

card cage

A mechanical assembly in the shape of a frame that holds modules against the system and storage backplanes.

CD-ROM

Compact disc read-only memory. The optical removable media used in a compact disc reader mass storage device.

central processing unit (CPU)

The unit of the computer that is responsible for interpreting and executing instructions.

client-server computing

An approach to computing that enables personal computer and workstation users—the “client”—to work cooperatively with software programs stored on a mainframe or minicomputer—the “server.”

clock

A signal used to synchronize the circuits in a computer system.

cluster

A group of systems and hardware that communicate over a common interface. *See also* VMScluster system.

console mode

The state in which the system and the console terminal operate under the control of the console program.

console program

The code that the CPU executes during console mode.

console subsystem

The subsystem that provides the user interface for a system when operating system software is not running. The console subsystem consists of the following components:

console program
console terminal
console terminal port
remote access device
remote access port
Ethernet ports

console terminal

The terminal connected to the console subsystem. The console is used to start the system and direct activities between the computer operator and the computer system.

console terminal port

The connector to which the console terminal cable is attached.

CPU

See central processing unit.

DC-DC converter

A device that converts one dc voltage to another dc voltage.

DECchip 21064 processor

The CMOS-4, Alpha AXP architecture, single-chip processor used on Alpha AXP based computers.

DECnet

Networking software designed and developed by Digital. DECnet is an implementation of the Digital Network Architecture (DNA).

DEC OSF/1 AXP operating system

A general-purpose operating system based on the Open Software Foundation OSF/1 1.0 technology. DEC OSF/1 Version 1.2 runs on the range of Alpha AXP systems, from workstations to servers.

DRAM

Dynamic random-access memory. Read/write memory that must be refreshed (read from or written to) periodically to maintain the storage of information.

DSSI

Digital's proprietary data bus that uses the System Communication Architecture (SCA) protocols for direct host-to-storage communications.

DSSI VMScluster

A VMScluster system that uses the DSSI bus as the interconnect between DSSI disks and systems.

EEPROM

Electrically erasable programmable read-only memory. A memory device that can be byte-erased, written to, and read from. *Contrast with* FEPROM.

environment variable

Global data structures that can be accessed from console mode. The setting of these data structures determines how a system powers up, boots operating system software, and operates.

Ethernet

A local area network (LAN) that was originally developed by Xerox Corporation and has become the IEEE 802.3 standard LAN. Ethernet LANs use bus topology.

Ethernet ports

The connectors through which the Ethernet is connected to the system.

Factory Installed Software (FIS)

Operating system software that is loaded into a system disk during manufacture. On site, the FIS is bootstrapped in the system, prompting a predefined menu of questions on the final configuration.

fast SCSI

An optional mode of SCSI-2 that allows transmission rates of up to 10 MB/s. *See also* SCSI.

FDDI

Fiber Distributed Data Interface. A high-speed networking technology that uses fiber optics as the transmissions medium.

FEPROM

Flash-erasable programmable read-only memory. FEPROMs can be bank- or bulk-erased. *Contrast with* EEPROM.

FIS

See Factory Installed Software.

firmware

Software code stored in hardware.

fixed-media compartments

Compartments that house nonremovable storage media.

front end unit (FEU)

One of four modules in the DEC 4000 AXP Rackmount system power supply. The FEU converts alternating current from a wall plug to 48 V dc that the rest of the power subsystem can use and convert.

full-height device

Standard form factor for 5 1/4-inch storage devices.

Futurebus+

A computer bus architecture that provides performance scalable over both time and cost. It is the IEEE 896 open standard.

Futurebus+ Profile B

A profile is a specification that calls out a subset of functions from a larger specification. Profile B satisfies the requirements for an I/O bus. *See also* Futurebus+.

half-height device

Standard form factor for storage devices that are not the height of full-height devices.

halt

The action of transferring control to the console program.

initialization

The sequence of steps that prepare the system to start. Initialization occurs after a system has been powered up.

interleaving

See memory interleaving.

LAN (local area network)

A network that supports servers, PCs, printers, minicomputers, and mainframe computers that are connected over limited distances.

latency

The amount of time it takes the system to respond to an event.

LED

Light-emitting diode. A semiconductor device that glows when supplied with voltage.

local area VMScluster system

Digital's VMScluster configuration in which cluster communication is carried out over the Ethernet by software that emulates certain computer interconnect (CI) port functions.

mass storage device

An input/output device on which data is stored. Typical mass storage devices include disks, magnetic tapes, and floppy disks.

memory interleaving

The process of assigning consecutive physical memory addresses across multiple memory controllers. Improves total memory bandwidth by overlapping system bus command execution across two or four memory modules.

MIPS

Millions of instructions per second.

mixed-interconnect VMScluster system

Digital's VMScluster system that uses multiple interconnect types between systems; for example, CI, Ethernet, DSSI, or FDDI.

MOP

Maintenance Operations Protocol. The transport protocol for network bootstraps and other network operations.

multiprocessing system

A system that executes multiple tasks simultaneously.

node

A device that has an address on, is connected to, and is able to communicate with other devices on the bus. In a computer network, an individual computer system connected to the network that can communicate with other systems on the network.

OCP

Operator control panel. The panel on the top right side of the DEC 4000 AXP Rackmount system that contains the power, Reset, and Halt switches and system status lights.

open system

A system that implements sufficient open specifications for interfaces, services, and supporting formats to enable applications software to:

- Be ported across a wide range of systems with minimal changes.
- Interoperate with other applications on local and remote systems.
- Interact with users in a style that facilitates user portability.

Open Systems Interconnect standards

Communications reference model defined by the ISO (International Organization for Standards). The OSI reference model consists of seven layers and defines protocols for the physical transmission of data, as well as the structuring and organization of data, so that it can be sent and received in a form that can be understood by conforming implementations. Conformance to the OSI standard will enable communication among computer systems from different vendors.

OpenVMS AXP operating system

Digital's open version of the VMS operating system, which runs on Alpha AXP machines. *See also* open system.

operating system mode

The state in which the system console terminal is under the control of the operating system software. Also called program mode.

operator control panel

See OCP.

PALcode

Alpha AXP Privileged Architecture Library code, written to support Alpha AXP processors. PALcode implements architecturally defined behavior.

power down

The sequence of steps that stops the flow of electricity to a system or its components.

power system controller (PSC)

One of four units in the DEC 4000 AXP Rackmount power supply subsystem. The H7851AA PSC monitors signals from the rest of the system including temperature, fan rotation, and dc voltages, as well as provides power-up and power-down sequencing to the dc-dc converters and communicates with the system CPU across the serial control bus.

power up

The sequence of events that starts the flow of electrical current to a system or its components.

primary cache

The cache that is the fastest and closest to the processor.

processor module

Module that contains the CPU chip.

program mode

See operating system mode.

RAID

Redundant array of inexpensive disks. A technique that organizes disk data to improve performance and reliability. RAID has three attributes:

1. It is a set of physical disks viewed by the user as a single logical device.
2. The user's data is distributed across the physical set of drives in a defined manner.
3. Redundant disk capacity is added so that the user's data can be recovered even if a drive fails.

Contrast with striping.

reliability

The probability a device or system will not fail to perform its intended functions during a specified time interval when operated under stated conditions.

remote access device

Hardware other than the local console terminal that can access a system's console user interface. The remote device is connected to the system through the system's auxiliary serial port or Ethernet.

removable-media compartment

Compartment in the enclosure that houses removable media.

RISC

Reduced instruction set computer. A computer with an instruction set that is reduced in complexity.

SCSI

Small Computer System Interface. An ANSI-standard interface for connecting disks and other peripheral devices to computer systems. *See also* fast SCSI.

self-test

A test that is invoked automatically when the system powers up.

serial control bus

A two-conductor serial interconnect that is independent of the system bus. This bus links the processor modules, the I/O, the memory, the power subsystem, and the OCP. It reports any failed devices to the processor module so the processor module can illuminate LEDs on the OCP.

shadowing

See volume shadowing.

shadow set

In volume shadowing, the set of disks on which the data is duplicated. Access to a shadow set is achieved by means of a virtual disk unit. After a shadow set is created, applications and users access the virtual disk unit as if it were a physical disk. *See also* volume shadowing.

SMP

See symmetric multiprocessing.

storage array

A group of mass storage devices, frequently configured as one logical disk.

stripe set

A group of physical disks that are used for disk striping. *See also* striping.

striping

A storage option that increases I/O performance. With disk striping, a single file is split between multiple physical disks. Read and write disk performance is increased by sharing input/output operations between multiple spindles, which allows an I/O rate greater than that of any one disk member of the stripe set. In striping, the loss of any one member of the stripe set causes loss of the set. Striping is particularly useful for applications that move large amounts of disk-based information, for example, graphic imaging. *Contrast with* RAID.

symmetric multiprocessing (SMP)

A processing configuration in which multiple processors in a system operate as equals, dividing and sharing the workload. OpenVMS AXP SMP provides two forms of multiprocessing: multiple processes can execute simultaneously on different CPUs, thereby maximizing overall system performance; and single-stream application programs can be partitioned into multistream jobs, minimizing the processing time for a particular program. *Contrast with* distributed processing.

system bus

The private interconnect used on the DEC 4000 AXP Rackmount CPU subsystem. This bus connects the B2001 processor module, the B2002 memory module, and the B2101 I/O module.

system disk

The device on which operating system software resides.

TCP/IP

Transmission Control Protocol/Internet Protocol. A set of software communications protocols widely used in UNIX operating environments. TCP delivers data over a connection between applications on different computers on a network; IP controls how packets (units of data) are transferred between computers on a network.

thickwire

An IEEE standard 802.3-compliant Ethernet network made of standard Ethernet cable, as opposed to ThinWire Ethernet cable. Also called standard Ethernet. *Contrast with* ThinWire.

ThinWire

Digital's proprietary Ethernet products used for local distribution of data communications. *Contrast with* thickwire.

uninterruptible power supply (UPS)

A battery-backup option that maintains ac power if a power failure occurs.

UPS

See uninterruptible power supply.

VMScluster system

A highly integrated organization of Digital's VMS systems that communicate over a high-speed communications path. VMScluster configurations have all the functions of single-node systems, plus the ability to share CPU resources, queues, and disk storage.

volume shadowing

The process of maintaining multiple copies of the same data on two or more disk volumes. When data is recorded on more than one disk volume, you have access to critical data even when one volume is unavailable. Also called disk mirroring.

warm swap

The shutdown and removal and replacement of a failing DSSI disk from an active bus.

word

Two contiguous bytes (16 bits) starting on an arbitrary byte boundary. The bits are numbered from right to left, 0 through 15.

write-enabled

A device is write-enabled when data can be written to it. *Contrast with* write-protected.

write-protected

A device is write-protected when transfers are prevented from writing information to it. *Contrast with* write-enabled.

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